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DISPATCH OF "THE RAILWAY GAZETTE"
OVERSEAS

We would remind our readers that there are many overseas countries to which it is not permissible for private individuals to send printed journals and newspapers. THE RAILWAY GAZETTE possesses the necessary permit and machinery for such dispatch, and any reader desirous of arranging for copies to be delivered to an agent or correspondent overseas should place the order with us together with the necessary delivery instructions.

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TO CALLERS AND TELEPHONERS

Commencing Monday, November 11, and continuing until further notice, our office hours are:-

Mondays to Fridays - 9.30 a.m. till 3.45 p.m.

The office will be closed on Saturdays

Sir Charles Morgan

THE passing of Sir Charles Langbridge Morgan recalls memories of a great period in railway engineering history to which he contributed notably. After a quarter of a century of strenuous and eventful activity on both new works and maintenance, first with contractors and later with the Great Eastern Railway, Morgan was appointed Chief Engineer of the London, Brighton & South Coast Railway in 1896. He was then only 41, an ideal age for a man with his already wide experience and outstanding ability at which to set out on a big job with complete authority. At that time, although the old Brighton line had a well founded reputation for its engines and carriages, built up under the genius of the then but recently departed Stroudley, it was not famous for the excellence of its permanent way and other engineering equipment. Morgan set out with characteristic vigour to put this right, and when, after 21 years he retired, there was no better-found property in the country than the way and works of the L.B. & S.C.R. There is testimony to the length of his vision in the fine new stations he designed in connection with various important widening works and rebuildings for which he was responsible. Even for the phenomenally grown traffic stimulated by electrification, Morgan's stations are still ample, as witness Victoria and the stations rebuilt on the widenings out to Balcombe tunnel. Morgan did not get the money for such ambitious works without opposition, but he could always make a case which, in the long run, proved to be justified. A notable example was the new station at Bognor, built to replace the former dingy edifice destroyed by fire. He was reproached for the extravagance of a scheme which included a booking hall that dwarfed every other public building in the town; but he stuck to his guns, and the traffic returns of Bognor thereafter leapt forward.

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Railways and Public Relations

Since the announcement by the Minister of Transport of the decision to increase certain railway charges from the beginning of next month, and the publication of the report of the Charges (Railway Control) Consultative Committee as a White Paper, there has been some evidence in the general press of a better understanding of the basis of the necessity for the advance. There can be little doubt that to a considerable extent this has been due to the fact that Lt.-Colonel J. T. C. Moore-Brabazon did not confine his announcement to a statement in the House of Commons, but also held a conference with the press and explained the position. In THE RAILWAY GAZETTE of November 1 attention was drawn to the usefulness of this contact with the press as a means of spreading a better understanding and checking the growth of misconception. It is not always possible, of course, to keep the public informed of even a broad outline of negotiations while they are in progress, but experience has shown that shrouding discussions in which there is wide interest in a veil of mystery leads to conjecture and rumour which often result in the establishment of important misconceptions all too difficult to remove later. In cases where direct railway interests are involved there appears to be no good reason why representatives of the companies should not be present with the Minister at these conferences. Their intimate knowledge of operating and other conditions on the railways would enable them to draw on first-hand experience in answering many of the points that might arise, and would have the added advantage of establishing, even in a modified form, that contact between the companies and the press which has been sadly lacking since the advent of Government control.

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Grade Separation in U.S.A.

Some impression of the scale on which the problem of grade separation—the substitution for road and rail level crossings of overline or underline bridges—is being tackled in the United States is gained from the fact that the Federal Aid Highway Bill, recently signed by President Roosevelt, authorises the expenditure of \$20,000,000 in crossing elimination in each of the two years ending June 30, 1942, and June 30, 1943, respectively. The amounts are divided between the various States in accordance with the relative urgency of the work, and are, of course, the greatest

in those States having the densest population and the heaviest traffic. Thus New York State heads the list with a projected expenditure of \$1,334,000, followed by Pennsylvania with \$1,127,000; rather more surprisingly an outlay of \$1,087,000 is planned in Texas, but \$1,030,000 in the State of Illinois is readily understandable. In no other States is the million mark to be reached, but in Ohio \$833,000 is to be spent, in California \$741,000, and in Michigan \$647,000. In the United States grade intersections are by no means confined to road-rail crossings, for the majority of intersections of one railway and another are made on the flat, and apart from the obstruction to traffic so caused, these crossings, which often require some speed restriction, may hamper the operation of high-speed trains. But grade separation of rail-rail crossings proceeds much more slowly; it is doubtless regarded as the concern of the railways alone, and so does not fall within the orbit of Government assistance, mainly because the comprehensive signalling of railways eliminates most of the risks inherent in such level crossings.

* * * *

Overseas Railway Traffics

For Argentine railways the traffic returns in the 17th week of the financial year were unsatisfactory except on the Argentine North Eastern, but the figures for the 18th week were generally better, so that on the Argentine North Eastern there was an improvement of 18,300 pesos for the two weeks and the Buenos Ayres Western showed a net gain of 40,000 pesos. On the Buenos Ayres & Pacific, the Buenos Ayres Great Southern, and the Central Argentine the decreases in the 18th week were less by 18,000 pesos, 219,000 pesos, and 206,100 pesos, respectively, than in the previous week. The Central Uruguay is £36,142 up on the 44 weeks of the current year.

	No. of Week	Weekly Traffics	Inc. or Decrease	Aggregate Traffic	Increase or Decrease
Buenos Ayres & Pacific*	18th	1,090	- 15	20,104	- 1,742
Buenos Ayres Great Southern*	18th	2,047	+ 61	33,668	- 1,253
Buenos Ayres Western*	18th	723	+ 98	11,406	1,080
Central Argentine*	18th	1,352	- 137	25,064	- 9,526
		£	£	£	£
Canadian Pacific	43rd	1,178,600	+ 174,400	27,729,800	+ 3,307,200
Bombay, Baroda & Central India	29th	287,925	+ 37,500	5,577,675	+ 640,575

* Traffic returns in thousands of pesos.

Gross earnings of the Canadian Pacific Railway for the first nine months of 1940 amounted to £24,369,600, an increase of £3,280,800 over the first nine months of 1939, and the net earnings of £4,058,000 showed an improvement of £1,517,000. Great Western of Brazil traffics are still up both in sterling and currency, and the San Paulo to date is still substantially on the right side in sterling, although down in currency.

* * * *

Peruvian Corporation Railways

The railways and the connecting steamers on Lake Titicaca brought into the revenue account of the Peruvian Corporation for the year ended June 30, 1940, £143,161, against £93,943 for the previous year. Gross traffic receipts in currency were only slightly less, but, because of the higher value of the sol, the sterling gross receipts of £818,361 showed an improvement of £14,270. In the working expenses of £675,200 there was a reduction of £34,948. On the Central Railway of 259 miles on the 4 ft. 8½ in. gauge there was a heavy reduction in mineral traffic, partly due to the difficulties of foreign markets after the outbreak of war, while general merchandise was affected by increased road competition and the suspension of the important eucalyptus traffic. The net receipts of this railway were £2,857 lower, at £53,598. Results on the Southern system, which comprises the Southern Railway in Peru (535 miles on the 4 ft. 8½ in. gauge), the Guaqui-La Paz Railway (60 miles metre gauge) in Bolivia, and the connecting steamers on Lake Titicaca, were on the whole better, and the net receipts of £79,826 on the Southern Railway showed an advance of £45,072 because of improvement in wool and other local traffic. Sugar traffic increased on the Trujillo Railway (60 miles of 3 ft. gauge). The popularity of the self-propelled unit services and longer journeys travelled by passengers in them on this railway produced higher receipts. Similar results were obtained on the Pacasmayo Railway. On the Payta-Piura Railway conditions were adversely affected by

the state of the cotton market which also reduced the number of passengers.

Preferring the Illiterate Man

In the article on the centenary of railway inspection published in our issue of July 12, 1940, brief reference was made to the fact, which has often been noticed with surprise, that I. K. Brunel preferred to engage enginemen who were unable to read and write. His eminence in the engineering world of his day makes this view seem doubly odd to those who read of it for the first time now, but it was shared by several of his contemporaries and not infrequently found expression. Speaking at the Institution of Civil Engineers in 1862, and replying to the suggestion in the paper by James Brunlees that better paid—and better educated—men should be employed, as it would reduce accidents, Sir Joseph Paxton said he did not believe any good result would follow. "He would, in illustration, take the case of a pointsman. A man in that position spent a large proportion of his time in solitude. If educated, he would endeavour to employ his mind in some manner, such as reading the cheap periodicals, which would withdraw his mind from his work, whereas the uneducated man would in all probability have his attention fixed upon his duty solely. It was well known," he went on, "that the best stokers and engine drivers were not those which had been taken from the fitters in the workshop—men who were educated and had a mechanical turn of mind—but those who had been brought up in the mode now generally adopted on English railways." Promotion from cleaner to driver and the "practical knowledge" this acquired gave such men "a superiority" over those brought up in the shops.

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Women on Soviet Railways

More than half a million women are now employed on the railways of the Soviet Union, and some of them perform such duties as those of engine drivers and stationmasters, formerly considered the sole province of men. The first woman to become famous in the Soviet railway service was Zinaida Troitskaya, now superintendent of the Moscow Circular Railway. Three years ago she was the only woman engine driver on the Soviet railways; today there are 56 women engine drivers and 2,900 assistant engine drivers. In addition, many women are employed as motormen of electric trains. More than 2,000 Soviet women are employed as stationmasters and 200 as train dispatchers. Thousands of women are working in the railway workshops as mechanics, fitters, and turners. On some of the railways in the U.S.S.R. there are stations in which all the posts, ranging from the signal service to the stationmasters, are filled by women. One such team works at Chik station on the Tomsk Railway, which deals with a heavy freight and passenger traffic. The Soviet railways have an extensive system of training courses (attended by both men and women) for those who desire to enter the railway service and those who already work on the railways and want to improve their qualifications. Last year the number of persons attending these courses was 109,200.

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The Passenger and the Corridor

Despite the number of years that have elapsed since the corridor type of coach was introduced on railways, accidents, sometimes fatal, still occur through passengers mistaking an outer door for the one giving access to and from the corridor. Experienced travellers are not so likely to fall into this error, although there have been instances in which they have done so. The sliding type of corridor door has, in the main, superseded the one that opens outward, and it has the merit not only of making it more easy for the passenger to avoid mistakes but also overcomes the drawback of obstructing the corridor every time anyone enters or leaves the compartment. It is difficult to see what further measures can be taken to protect travellers from the consequence of their own actions, and the combination of hinged outer doors with safety catches and sliding inner doors should, it might be thought, provide all that is necessary. Most accidents of the kind referred to happen on night trains, when a passenger rouses

himself from a state of somnolence, and it is this fact that makes the problem more difficult of solution.

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Level Crossing Warnings

The recent accident at a North Devon level crossing, where a gateman put his signals "on" and allowed a lorry to start across the line after "Is Line Clear?" had sounded on the block repeating bell, has again directed attention to the question of warning indications at such places. The gateman professed not to have heard "train entering section," which seems, however, to have been duly given. Block repeating bells can, of course, give only a transitory warning and everything depends on their being heard and conformed to. They do not give any intimation of the direction of an approaching train. Visual indicators in the block circuit are sometimes provided, but there is a difficulty in making really effective ones to work with some types of existing block apparatus and certain electric token instruments. Something positively set in action by the train would appear to be the real solution of the problem; but cost of installation and maintenance has to be considered, and at many locations the traffic, either on rail or road or on both, would not justify much expense being incurred.

* * * *

Possible Locomotive Improvements

Despite the overwhelming proportion of steam locomotives in the world's stock of railway motive power, it is problematical whether steam will be considered as standard for new passenger construction for long after the end of the war. Quite apart from its low thermal performance, the steam locomotive cannot really be considered highly efficient as a traffic machine, but as long as it is perpetuated recognition should be given very fully to the fact that attempts to improve the thermal efficiency are largely a waste of time. Even if some improvement cut the fuel bill by 25 per cent. at one step, the fuel bill is not always a very large proportion of the gross operating cost, and such improvements have a habit of cancelling themselves out by increased shed charges and failures on the line. The locomotive is primarily a traffic machine, and the main direction in which improvement can be effected is to modify the mechanical design so that an availability much nearer 100 per cent. than the usual standard is obtained. A railway with a stud of main-line locomotives which could run 250,000 to 300,000 miles between heavy overhauls would find that fewer locomotives were necessary for a given traffic, and that the servicing facilities would be cut down correspondingly. A function of the mechanical department is to provide this high availability; the business of the traffic and operating departments is to make the best use of it.

* * * *

Absent Friends

We wonder what happens in wartime to the model travellers whose portraits used to adorn the pages of railway publicity booklets. Immaculate in appearance and endowed with the indefinable quality of poise, they lounged elegantly in compartments somehow immune from invasion by persons less well-groomed. The conversation of the men was evidently witty, for the ladies listened to it with smiling appreciation. When they visited the restaurant car, they registered an approval of the menu in pleasant contrast to the resigned "we can take it" demeanour of present-day railway diners waiting to be fed. We find it impossible to imagine them shouldering their way along a crowded corridor, or scrambling to pull coats and suitcases off the rack when the gloomy vault beneath which their train stops in the blackout turns out not to be a tunnel but the station where they must alight. Perhaps the men today hold commissions in famous regiments, and the ladies are commandants in the services appropriate to their sex. We hope not, for one can have too much of uniform. We like to think that on the lawns of the country establishments where the railways now have their headquarters they still sit, chat, and sip their cocktails, ready to return unruffled by the cataclysm when once again railway travel can be undertaken for (and with) pleasure.

Public Criticism of Railway Services

SINCE intensive air raids began on this country, railwaymen have been working under the most trying conditions to maintain as nearly normal as possible those essential services on which the industry of the country as well as the travelling public is dependent. Their complete disregard for their personal comfort and safety, and the large measure of success which has attended their arduous work, have evoked warm commendation from members of the Government who, next to those actively engaged in the work of maintaining the lines in action, can alone have full knowledge of the difficulties under which the railway staffs and administrations have laboured. It is an unfortunate necessity of modern warfare that much that occurs must necessarily be hidden for fear of conveying useful information to the enemy, and for this reason the railways have been unable to take their passengers and traders into their confidence as fully as they would have wished. There can be no doubt that if the railways had been free to tell the whole, or even a substantial part of the story which lies behind the deterioration of the railway services, the blame which has lately been levelled at the major transport system of the country would have given place to praise for the manner and speed with which difficulties have been overcome and the movement of traffic maintained. In large part the criticisms of railway services have emanated from passengers. The ordinary traveller is naturally concerned, to the exclusion of other considerations, with the performance of the train which he happens to be using. He is unaware of two very important matters which bulk largely in its operation. In the first place there is the vast increase of goods traffic essential to the war effort, which throughout the 24 hours has to be moved about the country and which is a vital part of the nation's war effort. The growth of that traffic, not only in the form of munitions and the like, but also of raw materials to feed the industries of this country which are now operating at a higher level than for many years, has been very great, and has placed a heavy strain on railway resources. Nor should it be forgotten that enemy action may necessitate the temporary diversion of traffic from normal channels, and this of course affects not only traffic usually carried by rail but also that which in ordinary circumstances passes by other means. All this additional traffic has to pass over tracks which 18 months ago were at the disposal of the country for the transport of peacetime traffic. Large numbers of troops are also being moved about the country and on many occasions the railways have had to cope with such special factors as the evacuation of certain classes of persons from one area to another. Every train has to be fitted into a complex system of train movement, and it is impossible to assess the nearness or the remoteness of an event which may have its repercussions upon a particular section of the line.

These conditions in themselves would have taxed the ingenuity of the administration of the railways in a country where train movement is already one of the densest in the world. Superimposed upon this, however, has been the effect of enemy bombardment from the air. The railway systems are, of course, a legitimate object of enemy bombers, and if the disorganisation which these raiders have attained is less than they sought to achieve it is because of the diligence, self-sacrifice and pre-vision of the railways in planning against possible contingencies. Lord Stamp has pointed out that, for the purpose of assigning praise and blame, to complain that a train from King's Cross or Paddington on a particular journey was 25 or 45 minutes late, "with no air raid warning in operation," is "as long as a piece of string." It might represent incompetent operation; on the other hand it might be almost a miracle of resourcefulness and duty. An examination of some of the complaints which have been made shows how out of touch with reality are some of the fiercest critics. On several occasions it has been suggested that during air raids trains should be run at their ordinary peacetime speed. It has even been suggested that a few train smashers as a result would not be of major importance. That, of course, is a matter of opinion, but hardly likely to be one shared by a responsible railway administration, though, in the light of experience it has now

been decided to raise the speed limit of trains during daylight air-raid warnings. The public and press are naturally anxious to secure the utmost and most efficient transport at these times, but their desire in this connection is not less than that of the railway administration whose task would be immensely lightened were it possible to run more and faster trains. The physical difficulties of doing so are known only to those who have to devote their time to that operation, though some slight idea of their nature and magnitude may be gathered from recent articles we have published in these pages.

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Argentine Railway Charges

FALLING gross receipts and rising working costs during the first nine months of 1940 have forced the British-owned railway companies in Argentina to appeal to the Government for permission to levy higher charges. The increase in rates which is sought is 5 per cent. to be levied at the discretion of the companies. At the same time the companies have expressed their willingness to charge less than the full additional amount in respect of certain traffic which in their opinion would not bear the whole of the additional tariff. In support of the application it is claimed that aid of this kind is urgently required if interruption of the railway services is to be avoided. Recently the companies acceded to a suggestion of the Government that they should reduce maize rates so as to help the growers over a period of temporary difficulty. The claim now made follows similar requests from time to time during the past two years. On this occasion it is reported that the companies are more optimistic of success, as they believe that the Argentine Government shares their opinion that it may not be possible to continue certain of their services unless the higher tariff is implemented. In THE RAILWAY GAZETTE of November 1, at page 454, a detailed analysis was published of financial results for the two years to end June, 1939, and 1940, compiled by the Instituto de Estudios Económicos del Transporte. This showed that in the later period the combined gross income of all the privately-owned Argentine railways had fallen by 18,000,000 pesos to 386,000,000 pesos.

British investment of capital in Argentine railways of £277,000,000 is a very large stake, and there can be no question that the present position of the lines is discouraging. The annual reports of the railways which are due shortly cannot be other than disappointing as is shown by the decline in traffics in the year ended June 30, to which the pending accounts will relate. It is known also, that since that date the position has become still worse. As was recorded in THE RAILWAY GAZETTE of October 25, the Central Argentine has been forced to seek a moratorium from debenture and note holders. The unsatisfactory traffics which had been reported by that company for many months to some extent, had prepared stock holders for this blow. The Stock Exchange is now reported to be fearing that both the Buenos Ayres Great Southern and Buenos Ayres Western companies may find it necessary to take a similar course. The gross figures which have been issued by these companies do not suggest that so drastic a step should be necessary for these companies. In any case it is a little strange to find the suggestion in *The Financial Times* that "nationalisation with compensation on a fair basis . . . would be considered by many investors a satisfactory solution of the present difficult situation." There is no good reason to suppose that the financial decline of the companies is permanent or other than could be directly attributable to the dislocation occasioned by the war. Further at a time of severely depressed stock market quotations it is unlikely that a "fair" basis of compensation would prove easy of achievement. In THE RAILWAY GAZETTE of October 25 at page 430 a nationalisation project put forward by a Deputy in the Congress was recorded. That, briefly, suggested compensation basis on a valuation of the capital account of each company. Compensation, it was suggested, should be made by way of 30-year bonds bearing 3½ per cent. interest and with provision for amortisation at the rate of 1 per cent. yearly. An alternative suggestion made by the same Deputy was that raw materials

might be utilised on a barter system for the purpose of acquiring the railways. It is hardly conceivable that any suggestion, even remotely akin to this Deputy's conception of equity, would commend itself to proprietors of Argentine railways financed from this country. It is worth bearing in mind that Sir Follett Holt, chairman of both the Buenos Ayres Great Southern and of the Buenos Ayres Western companies has recently foreshadowed a considerable improvement in Anglo-Argentine trade as a result of the Willingdon Mission investigations and recommendations. He also hinted that he believed the authorities in Buenos Ayres would grant the increase in tariffs now being sought.

* * * *

United States Transportation Act, 1940

THE United States Transportation Act of 1940 was signed by President Roosevelt in the third week in September. In the main, it shows a disposition on the part of Congress to view the transportation problem as a whole, and to disregard all considerations except those concerning the public interest. It lays new duties and responsibilities upon the Interstate Commerce Commission, and is a mark of confidence in that body as expressed by Congress and the country. The Act contains a declaration of national policy under which Congress pledges itself to treat all modes of transportation fairly and impartially. The declaration also indicates that Congress will aim at all forms of transportation being regulated by the same agency, the I.C.C., and in the public interest; in safeguarding the latter the Commission will in future be given greater discretionary powers.

One of the most important provisions of the Act is the establishment of a board of investigation and research, composed of three members appointed by the President. This board will investigate the relative economy and fitness of the various forms of transportation to determine the service for which each is specially fitted, so that there may be developed a national transportation system throughout the States. It will also ascertain the extent to which the several classes of carriers have been subsidised by the Government and the scale upon which taxes are imposed upon such carriers. The board is, moreover, authorised to investigate any other matter relating to transportation; this, the railways consider, should enable Congress to formulate further and more constructive legislation. At the same time, they realise only too well that the Act is far from solving the railway financial problem, and that it cannot result in immediate large increases in revenue. In fact, they consider that some of its provisions are unwise, and they deprecate the omission from it of any restraining influence over the improvident expenditure of public funds for the extension of waterways, or of any modification of the Panama Canal or Denison Acts.

UNDERGROUND CHAIN ROPE RAILWAY OPENED IN MANSFIELD, GERMANY.—An underground chain rope railway, reported to be the first in the world, has recently been inaugurated by the Mansfeldsche Kupferschieferbergbau A.G., Mansfeld, the only copper mine in Germany. The line is nearly 3 km. long and its construction occupied 22 months, according to the *Neue Leipziger Zeitung* of April 21 last, of which copies have only recently reached this country. It is electrically driven, and the small locomotives operating it have a weight of 15 metric tons. The railway has to overcome an inclination of from 5 to 7 per cent. and develops uphill and downhill a speed of 11 km.p.h. There are three brakes, independent of one another. Each locomotive draws 35 wagons weighing 550 kg. each, or 15 passenger cars with 8 workers each. Mining work in this copper pit had advanced so far over a long period of years that many miners had to cover a long distance underground before reaching their place of work. As these underground routes are counted as working time, an effective working time of less than 5½ hours a shift remained in some cases from a shift of 8½ hours. The construction cost of the railway is stated to have been approximately RM. 1,000,000.

PUBLICATIONS RECEIVED

Messengers for Mankind. By Wilfrid L. Randell. "Conquest of Space and Time" Series, No. 5. London: Hutchinson & Co. (Publishers) Ltd., 34, Paternoster Row, E.C.4. 9½ in. x 6 in. x 1 in. 240 pp. Coloured frontispiece and 131 illustrations. Price 7s. 6d. net (including extra war costs).—One of the most fascinating chapters in the history of mankind is that relating to the progressive development in methods of communication, from the earliest primitive signals by voice or gesture, to the present-day marvels of telegraphy and radio. Mr. Randell, whose previous works on the same subject are well known, takes us in the present volume back to the time when the range of communication between the members of the human race was limited to the range of voice and vision; when man's principal occupation was the eternal chase of food. Later in the long history of civilisation village communities were formed and news transmission gradually evolved, in primitive forms of signalling by drum beat or by other means, some of which endure among aborigines even to the present day. Five hundred years before the Christian era, Greek writers recorded stories of intelligence

flashed by torches from hill to hill and across the Aegean sea, but it was not until 1652 that Blake introduced flag signalling in the navy. The progressive acceleration in the evolution of the transmission of messages in more modern times is described in detail. The development of the post office and telegraphy by land and by ocean cable are the subjects of separate chapters. The former gives interesting illustrated descriptions of the work of the travelling post office and of the post office underground railway in London. There is a reproduction of the historic handbill of the Great Western Railway announcing the introduction of the railway electric telegraph in 1839. The thrilling story of the Atlantic cable is retold, and there is a special chapter on Faraday and his work. Samuel F. B. Morse invented his alphabet in 1832, but it was not until a comparatively recent date, 1874 in fact, that Alexander Graham Bell conceived the idea of the telephone. And so we are taken through the years to radio and television. The work of the Radio Research Board's station at Datchet, under Prof. Appleton, especially in the improvement of the Atlantic telephone, might have been mentioned,

and there is no reference to the overseas short-wave service carried by the Chelmsford station until the B.B.C. organised its overseas broadcasting. The book is very well illustrated and the drawings and schematic figures are particularly clear. There are photographs of the leading personages prominent in the history of telegraphic and telephonic communications.

Furnaces for the Railway Industry.—We have received from the Incandescent Heat Co. Ltd. of Birmingham a new list entitled "Furnaces for the Railway Industry." This is one of a series which the company is intending to issue under the general heading of "Furnaces for Every Industry"; the additional similar booklets which will follow in due course deal with the aircraft, automobile, shipbuilding, and other industries. That now before us, which measures 11 in. x 8½ in., is a practical treatise, and its purpose is to bring before the railway engineer the latest types of plant for all phases of heating and heat treatment in railway work. There are numerous illustrations and the furnaces shown are briefly described. We are asked to state that copies of the booklet can be obtained on application to the Incandescent Heat Co. Ltd., Cornwall Road, Smethwick, Birmingham.

THE SCRAP HEAP

"A Swiss friend of ours lately returned to Bâle from Hamburg, and had to change trains 52 times owing to the activities of the R.A.F. His only comment was that he wished it had been 70."—Extract from a letter to "The Times."

* * *

A London reader points out that one of the Yorkshire buses now running in the metropolis contains the notice:

"Mind Your Head While Rising."

He asks me if this is the secret of Yorkshire success in business.—*Northerner II* in "The Yorkshire Post."

* * *

ENGINE IMMORTALITY

It was with rather a shudder that we viewed the massive frames of a few old locomotives as our train recently swung past a railway yard. They were rust-riddled, and their fronts gaped skywards like the nozzles of huge howitzers. We recalled happy Easter tides and Bank Holidays when *Rob Roy* and the *Seer of Craigenputtock* drew in to the platform, gleaming green and gold and puffing with the majesty of sheiks. The gleeful salutations of urchins on such occasions implied an intimate sense of personal possession. And, indeed, such engines are more than machines. When they have

braved a thousand blasts and topped their millionth mile drawing Premiers to London and Royal personages to Balmoral, they have become institutions, personifications of the national ethos, the necessary genii of strath, and carse, and lochside. For such beings to be decimated into war scrap after rotting in dismal cemeteries at Cowlers or Uddingston seems an unfortunate termination. We suggest some method of incorporating them, *in toto*, in some live fabric of munitioneering. The worthy *Laird of Auchenshuggle* would then feel that, however slow and rheumatically, he was doing his little bit in a stressful time.—From "The Scotsman."

* * *

The clean and sociable Japanese made pleasant fellow travellers, although their hospitality on occasion was carried to excess. Whenever a new passenger entered a compartment on a train, he passed round a box of laxative pills. Courtesy demanded that one be accepted and swallowed. I did not mind taking one, but the Japanese were constantly getting off and on, and each newcomer would inevitably produce his little box. On long journeys I had to resort to sleight of hand.

But in spite of their embarrassingly frank customs and their strict observance of tradition, the Japanese were

enamoured of Western ideas. It seemed to me that they copied everything American, even to the numbering of their sleeping cars, and the rubber-tyred electric baggage motors were reproduced to the last screw.

I became much impressed with the efficiency of this people. The trains were run on time. I could set my watch by them. The Japanese showed the same efficiency outside the country. When I first went to Manchuria in 1916, in the days when it still belonged to China, the Japanese-owned South Manchurian Railway was the acme of perfection, with beautiful track and American-type Pullman cars. The railway had a fine hospital and maintained a medical school.—From "A Doctor's Odyssey," by Victor Heiser

* * *

When the final sequences of "49th Parallel," the new British Government feature film with an all-Canadian setting were "shot" recently, Niagara Falls railway station, the lower arch bridge, and the whirlpool rapids became studios overnight. Twenty soldiers from a nearby camp became actors; Mr. Frank McDowell, the Canadian National Railways Publicity man, became a director; and by the personal order of the President, Mr. S. J. Hungerford of the C.N.R., a five-car, all-steel special train shunted backward and forward in front of the cameras. Several dozen men and women drafted as extras from families of railway employees filled the special train.

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

ARGENTINA

Unwanted Maize

Reference has previously been made to Argentina's bumper surplus maize crop. The Government, the grain merchants, and most of the farmers are greatly disturbed by the problem of its disposal. There is no doubt that some of it will be utilised as fuel, although the fear of a fuel shortage has been considerably lessened since the coal intended for France, before the German conquest of that country, has since been offered to South American and other foreign markets.

In addition to the cessation of maize exports, the Argentine Government, fearing a shortage of these commodities—as the prospects for the coming harvest are none too rosy at present—has issued a Decree prohibiting the export of wheat and linseed. The country has an exportable surplus of over 7,000,000 tons of maize, with no prospective buyers. Such ideas as the extraction from maize of liquid fuel for internal combustion engines might be feasible at some future date, but the immediate problem is to dispose of the stock of grain before the wasteful process of deterioration creeps in. In order to relieve the distress of the growers, Congress has passed a Bill authorising the Government to take over the crop, paying for it at the rate of \$4.75 paper a 100 kg. in bags, ready and in a condition to be exported, and placed on wagon in the port of Buenos Aires, or at the equivalent price in other ports in the country. Similar arrangements have been made for the purchase of corn on the cob.

Government Loss 200,000,000 Pesos

It is anticipated that this operation will involve a loss to the Government of some 200,000,000 pesos, and it is significant that, in spite of the disastrous results of incursions into the realms of established minimum prices for the benefit of the grain growers in the past, the authorities should insist on this policy. The funds are to be taken from the exchange profits, but if these should prove insufficient, will be advanced by the National Bank. In this connection one of the Radical members of the Chamber of Deputies stated during the debate on the subject that, although there was theoretically a credit balance of 207,000,000 pesos in the Exchange Profits Fund, the amount in actual cash was only about eight millions, the rest being absorbed in advances to the Government and the National Wine Board. It therefore looks as if the National Bank will again have to be raided to give effect to the provisions of the Bill; a serious matter when it is acknowledged that the amount owing by the Government to that institution, on account of a similar arrangement in favour of the

farmers in connection with last year's colossal wheat crop, is 90,000,000 pesos.

UNITED STATES

Bay State and William Penn Expresses

On page 90 in THE RAILWAY GAZETTE of July 26 last, the inauguration on June 21 of the East Wind, a new all-coach express running each way between Washington and the New England coast resorts was recorded. Another daily express between Philadelphia and Boston—avoided by the East Wind—has been introduced as from September 29. The northbound train is known as the Bay State, and leaves Broad Street station at 8 a.m., arriving at Boston at 2.40 p.m. The southbound express, bearing the name William Penn, leaves Boston at 6 p.m. and arrives at 30th Street Pennsylvania station, Philadelphia, at 12.37 a.m. Both trains are made up of parlour cars, coaches, and a dining car. With these new trains Philadelphia passengers have the choice of six daily trains in each direction to and from Boston. They serve numerous other centres in New England and the Bay State has a through coach for Springfield, Mass. The William Penn will provide an additional even-hour service from New York (11 p.m.) to Philadelphia.

Fast Freight Train Punctuality

The Illinois Central System, claiming its MSI to be the fastest long-distance freight train in the world, celebrated the fourth anniversary of that train's inauguration on October 1. It leaves Chicago for Memphis every week-night, carries only less-than-car-load merchandise and provides overnight delivery to places 500 and second-morning delivery to places 1,000 miles distant from Chicago. Its punctuality record is remarkable, punctual arrival at destination having been recorded in 95 per cent. of the runs during the four years. Originally limited to a loading of 28 cars, this number has constantly been exceeded, sometimes by 100 per cent., and the average has been 38 cars for the past four years. Consequently, a second fast freight train has been running for nearly a year as a relief to MSI. It is known as SEI and terminates at Jackson, Tennessee; it has an average load of 36 cars.

RHODESIA

Advertising on Railway Premises

The erection of attractive new hoardings for the display of large 10-ft. high posters at stations on the Rhodesia Railways forms part of a recently-inaugurated campaign to attract advertisers to the excellent opportunities for outdoor advertising at 70 stations and certain sidings in Northern and Southern Rhodesia and the Bechuanaland Protec-

torate. Revised advertising tariffs have been issued, providing for large and small posters, painted signs, enamelled plates, and the like.

U.S.S.R.

Development of the Railways

According to *Izvestia*, over 9,000 miles of new railways were built between 1917 and 1937. The projected construction of railways under the third five-year plan (1938-1942) includes 6,835 miles of new lines and the doubling of 5,000 miles of existing lines; part of these works has already been completed.

The cession to the U.S.S.R. of Western Ukraine, Western Belorussia, Bessarabia, North Bukovina, part of Finland, and the new Soviet republics of Latvia, Lithuania, and Estonia, has added nearly 10,000 route-miles of line to the Soviet railway system, the aggregate length now being over 62,000 miles.

This year alone, a sum of over 5,000 million roubles is being expended by the Soviet Union on construction of railway transport and communications.

Rolling Stock and Equipment

During the period of the second five-year plan (1932-1937) the Soviet railways acquired 186,000 new wagons and over 6,000 powerful locomotives. A quarter of the rolling stock has been equipped with automatic couplings, and the whole of the goods stock is now fitted with the automatic brake. A large wagon-repair shop has been established, and 1,162 miles of railways have been electrified.

In July, 1935, the average daily loadings on the Soviet railways equalled 73,000 wagons, whereas in July last the figure had risen to 108,000 wagons.

SPAIN

Improved Train Services

As from September 1, the night express between Madrid and Barcelona has been supplemented by a second train. The train leaving the Atocha station at 7.0 p.m. continues to run with the same timings, arriving at Barcelona at 9.45 a.m. The second train, with sleeping and restaurant cars, leaves Madrid at 8.55 p.m., reaching Barcelona at 10.30 a.m. Another recent improvement in train service is noted on the Madrid-Badajoz line, where the tri-weekly express is now running daily. Motor fuel restrictions and price have had the effect of diverting to the railways a considerable amount of traffic.

Santander Central Station

Work has begun on the new central station which is to link up the four railways running into Santander. The Minister of Public Works turned the first sod on August 17, using for the purpose the historical spade used by Don Francisco de Asis, consort of Isabel II, for the inauguration in 1852 of the railway from Santander to Alar, which later became part of the Northern company's main line. The new station was referred to in THE RAILWAY GAZETTE of March 22, 1940, at page 405.

ELECTRIC TRACTION SECTION

Charles Merz

ALTHOUGH not known personally, nor even by sight, to many of the younger generation of electric traction engineers, Charles H. Merz at the time of his sudden death on October 15 was still a great power in the world of railway electrification. In recent years he did not always appear himself in the activities of Messrs. Merz & McLellan, of which firm he was senior partner, but his interest and dominating influence were always present in the firm's consulting work. His first direct connection with railways was in 1903, when he was appointed engineer for the electrification of the North Tyneside lines of the N.E.R., and before the beginning of the last war he had acted as consultant for big railway electrification schemes at Melbourne, Buenos Aires and Bombay, all of which were eventually brought to fruition, although delayed by the 1914-19 war. It was during that conflict that Merz & McLellan were commissioned to report on main-line electrification in South Africa, and after a preliminary investigation by Mr. F. H. Lydall—now one of the partners—Merz himself visited the Union, and not only checked the traction proposals but made comprehensive proposals for the development and control of electric power generation and distribution—the other phase of electrical engineering to which he was primarily devoted. Other railway schemes with which Merz & McLellan have been associated are the Newport—Shildon conversion on the N.E.R. (1914-15), and the main-line conversion proposals contained in the Weir Report on railway electrification in Britain. During the last 46 years the professional life of Merz had been extraordinarily full, yet he sought no limelight, and a catalogue of his activities does bare justice to the man, for the larger part of his power was latent and rightly gave his name and reputation an authority even greater than his works.

Outstanding Electrification Success

BOTH in this country and in other parts of the world it has been found that the electrification of a line previously operated by steam traction has resulted in a considerable increase in the number of passengers, as well as in the volume of goods attracted to the new service provided. There is no doubt that, from the point of view of the passenger, greater density of train operating which it is possible economically to effect with electric traction, greater cleanliness of travel, and the lower overall journey times are of considerable inducement to the greater use of the railway. These advantages also stimulate the growth of the outer suburbs of large towns and so enlarge the markets of the trader, who is also attracted to send his goods by rail under the improved conditions. One of the most outstanding examples of the success which has attended a railway electrification is provided by the conversion of the first section of the Central Railway of Brazil. Details of this project, which was entrusted to the Metropolitan-Vickers Electrical Co. Ltd., were published in THE RAILWAY GAZETTE Electric Railway Traction Supplement of March 4, 1938. It consisted of electrifying at 3,000 volts d.c. the 5 ft. 3 in. gauge main line from Rio de Janeiro to Barra do Pirahy with the branches from Deodoro to Santa Cruz and from Guedes da Costa to Paracamby. The first public electric train service on the suburban section began on July 10, 1937, and the whole of the suburban traffic out to Madureira (10½ miles) was operated by electric multiple-unit trains. The first portion of the electrification scheme, that is to say, the inner and outer suburban area of Rio de Janeiro extending to Nova Iguaçú and Bangú has been operating satisfactorily for about two years, and noteworthy results have been achieved. We understand that so successful has been the electrification in attracting a greater volume of traffic, both passenger and

goods, and also in the reduction of operating costs, that sufficient revenue has been raised to pay off the whole of the capital outlay, and at the same time defray interest charges.

At the time the conversion contract was signed in March, 1935, certain of the benefits which have now matured were visualised. The Central Railway comprised 3,142 km. (1,950 miles) of route on three different gauges, but 40 per cent. of the whole traffic on the 1,262 route-km. (780 miles) of 5 ft. 3 in. gauge line was over the 147 km. (91.5 miles) between Rio de Janeiro and Barra do Pirahy, and from Deodoro to Santa Cruz. It was realised that once congestion was relieved on this part of the line, the result would be felt over the whole of the railway. It was obvious that choice should fall on the system which technically and economically satisfied not only present but also future requirements. No other system offered the same elasticity as electrification, as with trains of six coaches (two-train units) with a capacity of 1,280 passengers and a three-minute service over the four tracks between Rio and Deodoro, 40 trains an hour could run in each direction and carry 51,200 passengers. Under the then existing system of steam traction, even at rush hours, only 15 trains an hour were possible with a normal capacity of 16,000 passengers, calculated at 150 passengers a coach, which meant that a large number of the passengers were travelling on footboards, platforms, roofs, and engine tenders.

There is no doubt that in the financial success of this section of the line, a reduction in working costs has played a large part. Coal, oil, and firewood cost the Central Railway an average of 36,232 contos a year from 1925 to 1929, and in the same period annual fuel costs for the Rio—Barra do Pirahy—Santa Cruz lines averaged 14,728 contos, or 40 per cent. of the total. Transport of coal to the various depots represented 12 per cent. of the total transport of the railway occupying 13,070 wagons in 1929, and 1,188 trains with an average haul of 158 miles. Apart from the loss of wagons to remunerative traffic, the running of these trains cost 1,300 contos this year in fuel, lubricants, and staff. The cost of leading and unloading coal, as also loading the engines, called for 250 workmen at a yearly cost of about 1,000 contos of reis. Negotiations are understood to be in an advanced stage for the placing of the contract for electrifying the second part of the Central Railway. In view of the highly satisfactory results which have been achieved on the first section, and the local experience of the contractors, there is every reason why on this occasion also Metropolitan-Vickers Electrical Co. Ltd. should be entrusted with the remainder of the work.

Electric Railway Signalling

THE remarkably safe and efficient manner in which the dense traffic is dealt with on the underground railways in London and certain other cities, notably in the United States but in some European capitals also, as a result of the high degree of perfection to which signalling for electric railways has been brought, has not been achieved without many years of patient development, in which the research and experimental work of the signalling industry has been combined with a large amount of practical experience gained in everyday working by the railway staffs. The first electric lines in London were equipped with manually operated signalling, there being then nothing else sufficiently developed to receive official sanction for underground services, and this remained on the Waterloo & City line until the recent rejuvenation scheme. Proposals for automatic signalling were often heard of, however, and one form of intermittent controlled equipment was put in on the Liverpool Overhead Railway as far back as 1893 and did good service for a long time.

The first electric line in London to have track circuiting throughout was the Great Northern & City, opened early in 1904, the step being facilitated by the adoption of the third and fourth rail system of traction. The apparatus was very simple, being on a straight d.c. system with neutral relays, and the signals were lamps behind coloured lenses; protection against false interference was obtained by positively locking the armature of the track repeater relay, when de-energised, until a release was transmitted by a last-vehicle brush contact maker at the overlap clearance point. This brush action was a favourite idea of inventors in this field at one time but was not suitable for general use, for more than one reason, and this type of equipment was not repeated in regular service anywhere else. The real development of electric railway signalling in this country, notwithstanding the admitted merits of the Great Northern & City scheme, which continued to give good service for many years, may be dated from the decision, taken under American influence, to adopt electro-pneumatic power and automatic signalling in connection with the electrification of the Metropolitan District Railway. The apparatus adopted there, and on the associated tube lines then being built, was very different in some respects from the present standard, which has since been gradually evolved as experience has shown improvements to be desirable and wider knowledge has produced more perfect means of attaining the desired ends. The principal basic change has been the adoption of a.c. in place of d.c. apparatus; but numerous constructional alterations, small in many cases though not the less important on that account, have also been effected, with a gratifying decrease in failures, always particularly unwelcome on such heavily worked lines.

Neither effort nor expense have been spared to give the London underground system the finest equipment that can be devised. The results achieved show that a wise course has been followed, while the experience gained has not been without considerable influence on the work most successfully carried out by the British signal contractor in the colonies and many foreign countries, thus directly contributing to the maintenance of the high regard everywhere felt for him. Much old equipment is still giving very satisfactory service, a great tribute to the skill of its original designers as well as of those who have maintained it. Despite the advent of the

colour-light signal many of the original District electro-pneumatic semaphores, probably the neatest design of lower-quadrant signal ever produced in this country, are still functioning satisfactorily, and, for our part, we shall be quite sorry to see them all disappear, although we fear we can advance little more than sentimental reasons for it.

Electrification and the Future

HITHERTO the touchstone by which the decision has been made whether or not to electrify a railway has been financial, in accordance with what are generally believed to be the principles of so-called sound finance, including the provision of work for work's sake. The final question has always been "Will it pay financially?" rather than "Is it desirable for the benefit of those who travel and who send their goods by rail?" or "Will it result in a net saving in energy expenditure?" The fact that, under the compulsion of dire necessity, no financial limit can be set upon production for war purposes, is significant, and will probably lead, after hostilities have ceased and the present compulsion is removed, to the reversal of the order of priority of these considerations. If such a change occurs, then the sole criterion of electrification will be whether or not the public would benefit by better services or by less expenditure of energy. By this touchstone the electrification of suburban railways round great cities would immediately be put in hand, because, beyond a certain density, train services can be provided with less coal consumption once the capital plant has been furnished, and an equivalent train service provided with less staff. The greatly increased service which can be given by electric traction is one of the things the public does want, and there are, of course, the obvious advantages of greater cleanliness and comfort—conditions of great importance not only to passengers, but to those who live in densely populated areas, and who, therefore, suffer from smoke-pollution. When the war comes to an end, and the productive capacity of the country for purposes of war and destruction are released, it would be absurd to close them down rather than to change them over to purposes of peace and construction. It is not too soon even now to give such a prospect serious consideration.

An Early Battery Locomotive

DURING 1898 and 1899 the Paris, Lyons & Mediterranean Railway experimented with a large battery locomotive, built to a design which it was hoped would be suitable for operating trains over the Paris—Melun line and adjacent branches. The wheel arrangement was 2-4-0 and the wheels were 44 in. in diameter.

According to the *Electrical World* of 1899 (pp. 146-7) the motor armatures were built up directly on the axles, and were 27 in. diameter with an active length of 22 in.; they were composed of 150 copper bars of 0.1 sq. in. sectional area insulated in micanite tubes, and had commutators at both ends, each provided with two sets of carbon brushes.

The main current was controlled by a special water rheostat consisting of an iron box of 60 cu. ft. capacity, in which hung 20 lead plates. The bottom of this box was connected with a large reservoir containing carbonate of soda solution and connected with the compressed-air system. The circuit was thus closed through a decreasing resistance by the rise of the solution up the lead plate. When the box was full an auxiliary circuit was closed which operated a short-circuiting switch, cutting out the rheostat. To stop the motors it was only necessary to release the air-pressure on the lower reservoir, and this operation was performed automatically by a circuit-breaker when the current reached 1,200 amp. The fields were separately excited by an 18-cell auxiliary battery through four mercury switches, by means of which the magnetisation could be reversed to secure reverse

motion of the locomotive, and all the switches were suitably interlocked.

The main battery consisted of 192 Fulmen cells carried in a separate tender. Each plate was enclosed in a perforated celluloid envelope, those surrounding the positive plates being lined with asbestos cloth. The positive and negative plates in their envelopes were separated by square rods of celluloid. Each cell had 29 plates weighing a total of 175 lb., and the capacity of the battery was 500 amp. for 1½ hr.

The results obtained on the line were: maximum load drawn (including tender but not the locomotive itself) 147 tonnes which was propelled at 30 m.p.h. with the motors in series. A higher speed was impossible without exceeding the safe current from the battery. With the motors in parallel a speed of 60 m.p.h. was obtained with a load of 100 tonnes. The armatures could carry continuously a current of 700 amp. which at a speed of 500 r.p.m., equivalent to 60 m.p.h., required an electro-motive force of 360 volts, the two armatures under these conditions absorbing roughly 500 kW. Estimating their efficiency at 90 per cent. the effective output would be about 611 h.p.

SWEDISH ELECTRIFICATION.—Last year the Swedish Riksdag granted a further 8,000,000 kr. for the completion of the then existing programme for the electrification of certain lines on the State Railways, but in view of the difficulties of obtaining with certainty and economy supplies of foreign fuel the above allocation has been increased to 16,000,000 kr. so that further lines may be converted and greater use made of Sweden's own hydraulic power resources.

Rejuvenation of the Waterloo & City Tube, Southern Railway

This 42-year-old line, connecting Waterloo and the Bank, has been modernised and equipped with new rolling stock and signalling

Early Years

EARLY in the history of the London & South Western Railway the desirability of having a terminus nearer the City of London than Waterloo was recognised, and in 1846 an extension to London Bridge was authorised. The powers were abandoned after the financial crisis of 1848, which caused such a serious depression in railway circles, and the high cost of securing land and acquiring property along any such route in after years led to more than one similar proposal remaining in abeyance. The great success of the City & South London Railway, opened at the end of 1890, showed that an underground electric line would give the facilities needed, and shortly afterwards an independent company was formed, under the auspices of the London & South Western board, for the purpose of making a line from Waterloo to the City. The plans were drawn up by the well-known engineers, W. R. Galbraith, R. F. Church, and J. H. Greathead. The last named, who died during the course of the work, had constructed the City & South London line; he was succeeded by Dr. A. B. W. (later Sir Alexander) Kennedy.

Powers and Route

Powers were obtained in 1893 and the work was begun by John Mowlem & Co. Ltd. in June, 1894, with the sinking of staging and construction shafts in the Thames near the Surrey shore, a little to the west of Blackfriars bridge. From this point the two iron tube tunnels were driven in opposite directions, namely beneath Queen Victoria Street towards the site of the City terminus; and towards Waterloo, passing under private property on the south bank of the Thames, following Stamford Street and York Road, and curving round to a station formed under what were originally the old North, Central, and South stations at Waterloo and ending in a yard beyond, alongside which the generating station was built. A short branch tunnel connected the up line, at a point just beyond the Waterloo station, with a 30-ton lift, communicating

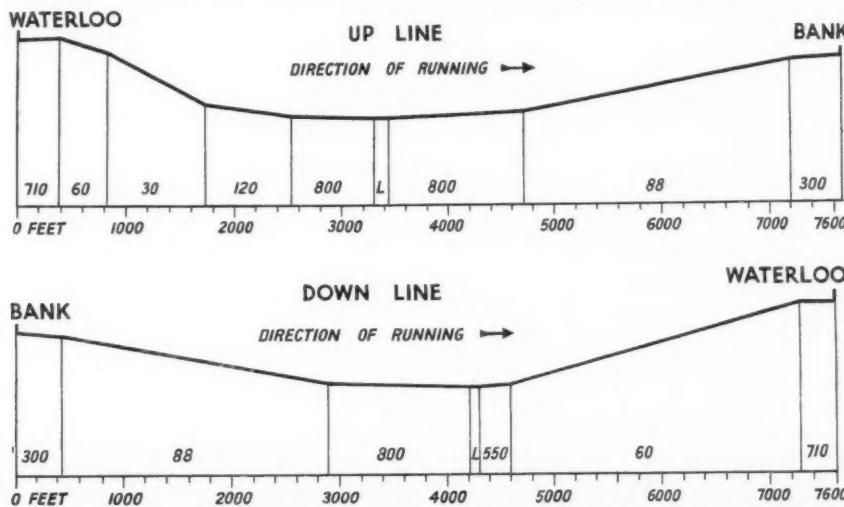
with a siding above, and giving access to the L.S.W.R. lines on the surface.

Between the shafts and the City the two tubes, which are level with each other throughout this section, were driven entirely through the London clay without any difficulty, but a short length near Blackfriars station, District Railway, was constructed in compressed air to meet that company's requirements that there should be no risk of subsidence of the ground. The diameter of these tubes was 12 ft. 1 $\frac{1}{4}$ in. A curve of 9-ch. radius was necessary in running round from the north-west corner of Blackfriars bridge into Queen Victoria Street. At the Waterloo end curves of 9-ch. and 5-ch. radius were required, and it was decided to increase the tube diameter to 12 ft. 9 in. on the latter to allow them to be negotiated by the bogie stock proposed.

Heavy and expensive work was required where the line passed below the old South Eastern Railway Waterloo-Charing Cross viaduct, the abutments of which were underpinned down to the level of the bottom of the tubes. From this point the tunnels were constructed without shields for the short distance remaining before reaching the station works, which were carried out by separate contractors, Perry & Co. of Bow. The two tubes are not on the same level on this section, the up line falling at 1 in 30 leaving Waterloo and the down line approaching it at 1 in 60, this being the steepest gradient against the load. Compressed air had to be used for part of the distance under Stamford Street from the South Eastern viaduct, and a modified form of shield known as the hooded type was introduced by Mr. (now Sir) Harley H. Dalrymple Hay, Resident Engineer, to accelerate the work.

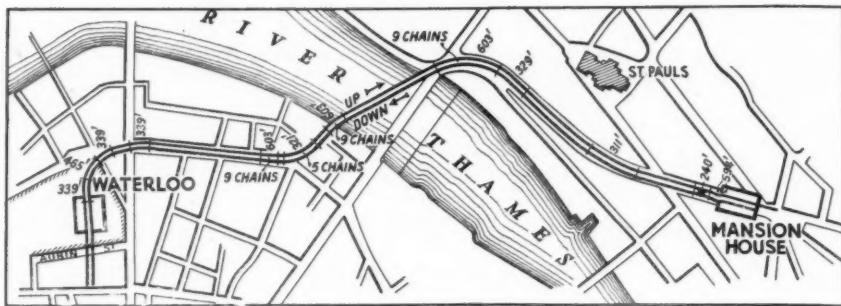
The Stations

The station at Waterloo involved some heavy engineering operations. The foundations of the main-line station did not go down to anything like the depth necessary for the low level electric line, which was to be connected by slopes and passages with the main station above, avoiding the use of lifts. The station was planned to run at right



Gradient profiles of the up and down tracks of the Waterloo & City underground line belonging to the Southern Railway

Map of the Waterloo & City Railway, showing the sharp curves on the south side of the Thames



angles to the arches, the piers of those concerned being underpinned in brick to platform level (about 17 ft. below the ground level and some 40 ft. below rail level in the main-line station) and joined by heavy brick and concrete invert. To provide space for a reversing siding beyond, a length of 22-ft. radius all-over arch was built, allowing one pier to be removed and leaving the inner ends of the older arches resting on the keystone of the new one, a remarkable piece of work. Beyond this arch the line terminated in carriage and coal sidings, between retaining walls, with the power station adjoining.

The City terminus consisted of two 23-ft. shield-driven station tunnels, with cross passages in the now familiar style, and a short length of similar diameter tunnel outside to accommodate a scissors crossing. The two lines were prolonged beyond the up end of the station to form sidings, although only the north side was so used at first. Access to the street was by a subway with a gradient of 1 in 9. It was originally intended to have lifts and their non-provision was a great mistake, the long slope being found very trying to elderly persons. An attempt was made to alleviate the nuisance in recent years by providing short sets of steps at intervals and flattening the slope between. Powers have been obtained to instal escalators but the war has caused the work to be postponed. The stairs, slopes, and long walks necessary at the Waterloo end were also a nuisance, but this has become less annoying since the escalators from the main concourse were put in.

Tunnel Construction

The tubes were lined smooth throughout with cement concrete to assist in reducing noise, and the line has always been comfortable in this respect. The short length of tunnel from the up ends of the Waterloo platforms to the iron tubes was built in brick and girder work. At the lowest point under the river the tops of the tubes are 23 ft. below the bed. At the City terminus the rails are 59 ft. below street level. The total length of the line is 1 mile 1,012 yd. and the accompanying diagram shows the curves and gradients. There are only two short pieces of level track, one on each road. The tubes were provided with lights spaced 60 ft. apart and at first they were kept on continuously. The permanent way was standard L.S.W.R. 87-lb. rail and chairs, secured to longitudinal sleepers bedded in concrete. A central channel-type conductor rail of 4½-sq. in. cross section was carried in the 4-ft. way on porcelain oil-insulators. The current supply was 500 volts d.c.

Power Station

The power house equipment comprised five Davey Paxman boilers feeding six high-speed Belliss & Morcom engines driving two-pole Siemens 200-kW generators with

drum armatures. The sets were very closely governed and it was claimed that by this means the lighting in the trains was little affected by change of load. Duplicate feed cables for both traction and lighting were run throughout the line, with frequent link switches. The rails were heavily cross bonded every 100 ft. and between the tracks at all tunnel cross passages. For a distance of 1,100 yd. from Waterloo a return reinforcing cable was laid in each tunnel.

Rolling Stock

Five 4-car trains, each seating 204 persons, were provided; the bodies were made by Jackson & Sharp, of Wilmington, U.S.A., and the electrical equipment by Siemens Bros. & Co. Ltd. Roller bearing axleboxes were used. The bogies at each end carried two gearless series motors of 60 h.p. maximum output, which had the armatures direct on the axles, as in the case of the City & South London locomotives. The control arrangements were rather involved, owing to the four motors being grouped all in series at starting and combined in various ways up to full parallel, necessitating eleven cables along the train, but these arrangements were modified later. The rather cumbersome controllers were operated by a hand wheel and originally had eight running and three intermediate positions.

Speed Restrictions

The sharp curves on the line prevented any advantage being taken of the down grades. Speed was restricted in 1898 by the Board of Trade to 10 m.p.h. on the 5-ch. curve, shortly afterwards increased to 12 m.p.h., and then to 15 m.p.h. in June, 1900, but even this greatly hampered the traffic, for all the preliminary calculations and estimates had been based on a speed of 20-25 m.p.h. round the curves and a top speed of 33 m.p.h. In 1912 the speed limit was raised to 20 m.p.h. The tickets were at first issued at turnstiles but, after permission to run with one guard only was refused, it was decided in 1900 to make the guards issue tickets on the trains and abolish the station staff. For a long time there were two men in the driver's cab, but a dead-man device was eventually introduced and the services of one man eliminated. The line was formally opened on July 11, 1898, by the Duke of Cambridge, and to the public on August 8 of the same year. It was soon seen that the midday traffic did not justify running the four-car trains, and in 1899 Dick, Kerr & Co. Ltd. supplied five 50-seat single-unit motor-coaches for the non-peak hours. In later years the four-car trains were strengthened to five vehicles. The single-car Dick Kerr units have continued to run during the day until the present rehabilitation of the whole line, and one of them is illustrated on page 514.

Power Supply and Distribution

THE Waterloo & City Railway originally depended for its power supply upon its own generating station situated at the Waterloo end of the line. Built in 1898, the power house contained six Belliss engines direct-coupled to Siemens bipolar dynamos having an output of 200 kW each at 380 r.p.m. An adjacent boiler house contained five boilers, the rated evaporation of each being 7,000 lb. an hour, and the working steam pressure 160 lb. per sq. in.

Compared with present-day standards, this seems a primitive steam plant, with an overall efficiency of 87 per cent, and a steam consumption of 27 lb. per kW at full load, and it was relegated to the status of standby plant when the suburban lines of the London & South Western Railway (now the Western Section of the Southern Railway) were electrified in 1915, and two 0.75 sq. in. 600-volt feeder cables were run from the main-line substation at Waterloo down to the main switchboard in the Waterloo & City Railway power house.

Equipment Changes

Three of the old steam sets were disposed of and the space taken up by auxiliary plant providing a 220-volt d.c. supply for other purposes. The remaining three steam sets were kept in good working order, and up to the present day have always been capable of taking over the supply notwithstanding their almost prehistoric appearance. But the time has come for this plant to make way for more modern equipment, and accordingly these engines and the accompanying switchboard are being swept away. A 600-volt battery, which was installed in 1913, is also being scrapped. This battery acted as a standby to the steam plant and was of sufficient capacity to provide energy to haul the trains out of the tunnels in the event of a major steam plant failure. It was also used to provide a supply of about 50 kW for lifts, pumps and lighting at Waterloo station during the period at nights when the 600-volt traction supply is normally shut down.

Non-traction Stand-by Plant

The Waterloo & City power house also contained three 600/230-volt d.c. motor-generator sets which were standbys for the 230-volt d.c. lighting system at Waterloo station, and also provided an alternative source of supply to the news theatre. These have been replaced by a 300-kW mercury arc rectifier of the pumpless type installed in the company's Milk Arch substation, which furnishes the 230-volt lighting supply to Waterloo station; the existing plant is two 150-kW glass bulb rectifiers fed from Deptford 11-kV supply. The supply for this rectifier is taken from an additional 11-kV feeder which has been added to the

Waterloo main line substation high-tension switchboard, fed from Durnsford Road power station, Wimbledon.

The Waterloo main-line substation is one of the Western suburban rotary converter substations supplied from Durnsford Road power station, but arrangements have now been made whereby an alternative high-tension supply can be obtained from the Eastern Section, which is supplied from the London Electric Supply Corporation's Deptford power station.

Feeder Cables

An additional 0.75-sq. in. feeder has been added to the two traction feeder cables from Waterloo main-line substation to the Waterloo & City power house. The three feeders are taken to a new eight-panel, black enamelled slate switchboard which has been erected at the end of the building. This switchboard, which controls the traction supply and other power circuits, is equipped with automatic remote-controlled high-speed circuit-breakers, all of which are operated from a new control panel installed in the Waterloo main line substation.

A 1.0-sq. in. traction feeder cable is run to each tunnel, and at the City station the conductor rails are connected to a high-speed circuit-breaker forming a tie-feeder equipment, which is erected in a small enclosure on the station platform. This circuit-breaker is automatic in its operation and will close only if and when both up and down tracks are energised from the main switchboard. A re-closing feature is incorporated which discriminates between overload and short circuit to effect a predetermined number of re-closes before lock-out occurs. All track circuit-breakers are also arranged for tripping from the pinch wire system described elsewhere. The original centre conductor rails have been replaced by new 100-lb. rails in the standard position in accordance with the requirements of the Ministry of Transport, and a special type of hook isolating switch for use in tunnels has been evolved.

Drainage Equipment

A system of five sumps deals with the leakage of water through the tunnels. The motor-operated pumps which empty these sumps, though 40 years old, still function, but it has been found necessary to renew all wiring, delivery and suction pipes. Certain pumps with their motors will also be replaced, but the main feature of the modifications to this system is a new automatic switchboard controlling all the eight pump motors. This is an eight-pillar switchboard containing automatic contactor starters which stop and start the pump motors through the medium of float switches fitted in each sump. A system of coloured lights and Klaxon horns is provided in the Waterloo & City boiler house to signal to the boiler house staff if a dangerous condition should ever arise at any particular sump.

Rolling Stock

FOR the opening of the Waterloo & City in 1898 five four-car trains of bogie coaches were built by Jackson & Sharp, of Wilmerding, U.S.A.; the bogies were assembled at the Eastleigh carriage works of the L.S.W.R. The motor-coaches contained 46 seats and the trailers 56, and both had wooden seats without upholstery. In 1899, five single motor-coaches were supplied by Dick, Kerr to maintain the non-rush hour services, and now, 41 years later, the new stock is being supplied by the successors to Dick, Kerr—the English Electric Co. Ltd.

The new rolling stock comprises 12 motor-coaches and 16 trailers, which are being formed into five 5-car trains for use during rush periods, each train consisting of two motor-coaches and three trailers. In off-peak hours the service is being maintained by five motor-coaches running singly, and detached from the 5-car sets. The three remaining coaches are considered as spares. A 5-car train has a total carrying capacity of almost 600 passengers, of which 60 per cent. are standing, the accommodation being arranged as shown on the motor-coach and trailer diagrams accompanying this article.

Control Apparatus

Each motor-coach is fitted with two axle-hung motors with sleeve suspension bearings and roller armature bearings, and having a one-hour rating of 190 h.p. The two motors on each motor-coach are mounted in one motor bogie. The arrangement of the control equipment has been given much careful attention in order to make the maximum possible space available for passengers. On the motor-coaches there is a driving cab at each end, and a small equipment compartment over the motor bogie. In the driving cabs there are a combined control and overload reset switch, a master controller, and a Loudaphone for giving telephonic communication between motorman and guard. A tunnel telephone hand set is also carried in each driving cab for use in emergency, and can be clipped to bare wires run the length of each tunnel. The clipping of the telephone to the wires automatically cuts off the current in the tunnel concerned and places the motorman in communication with the electric supply substation. In addition, at the motor end, there is an auxiliary cupboard containing single-pole knife switches and enclosed fuses for the auxiliary circuits, and a governor cut-out switch.

In the equipment compartment are mounted the main isolating switch and equipment fuse, the line switches, reverser, and power contactors, the motor-isolating switch, overload and current-limit relays, traction control and door gear potentiometers, no-volt relay, control and compressor governors, control cut-out switch, emergency lighting bat-

tery, and emergency tools. The main resistances and the compressor are mounted on the underframe.

Power and Control Circuits

The power supply is taken from the conductor rail by collector shoes mounted one on each side of each bogie of the motor-coach. There is no power bus line through the train so that each motor-coach collects its own power current. No shoe fuses are provided. The current is taken through a single-pole knife main isolating switch and a strip main equipment fuse to the control equipment. A drum type motor cut-out switch enables either motor to be cut out of circuit in case of emergency. The switch has no fixed handle but is operated by the master controller reversing key, so as to ensure that it is only operated when all power circuits are dead.

The control is of the multiple-unit type with electro-pneumatic unit switches. The operation is the normal series parallel one with bridge transition. An extra step of resistance is introduced in order to limit the initial acceleration of a motor-coach when working singly, and this step of resistance is connected between the two halves of the circuit on the motor side of the line switches LS.1 and LS.2, so that it also acts as a limiting resistance in case of overload. An excessive current in either motor operates the overload relay which is in series with it, and this causes LS.1 in the case of No. 1 motor, or LS.2 in the case of No. 2 motor, to open.

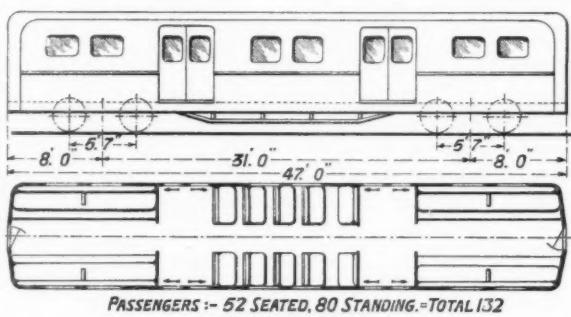
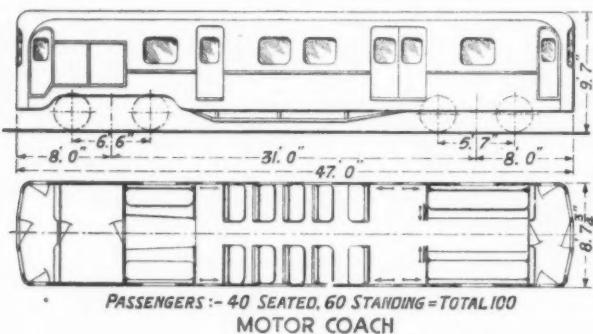
Whichever line switch opens first causes the other line switch to open immediately afterwards by means of interlock contacts. In this way the line contactors always open in sequence on an overload, the first one opening across the limiting resistance, and putting that additional resistance in circuit, and the second opening in series with the limiting resistance.

The two line switches are mounted separately and are fitted with an extended arc chute. There are 11 other power contactors comprising six resistance contactors and five circuit setting contactors, and these are identical with the line switches, but are without the extended arc chute.

The contactors are of standard design and are identical with those used on the Southern Railway surface line electric rolling stock. Automatic acceleration is used under the control of balanced armature current limit relays, and there are altogether nine series and six parallel notches.

Control Circuits

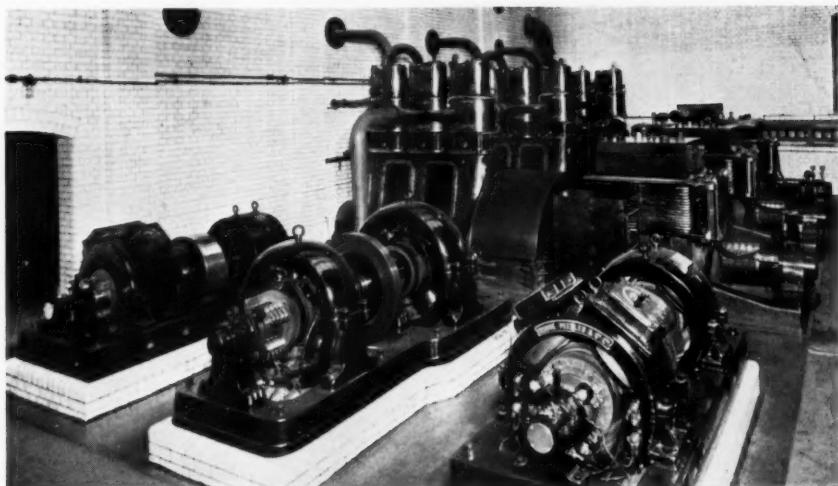
The master controller and through it the traction control train lines are supplied at line voltage (nominal 600 volts), but this is stepped down by means of potentiometers which



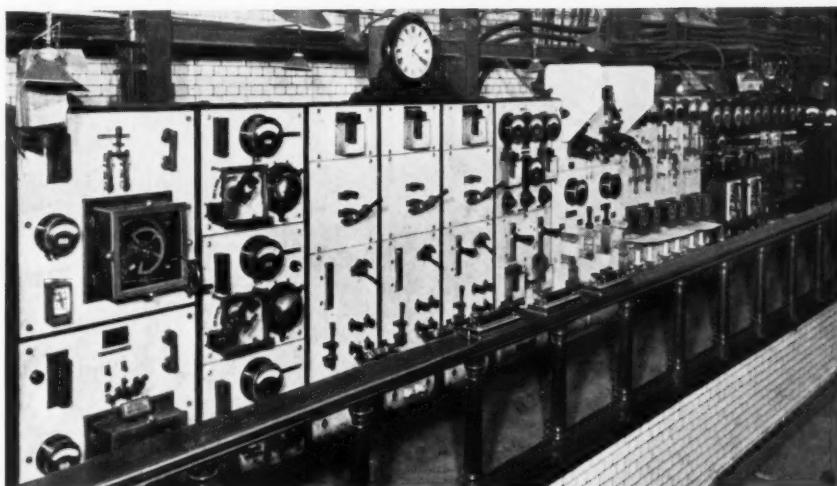
Motor-coach and trailer diagrams; the motor-coach tares 30½ tons

**Views on the
Waterloo & City
Railway**

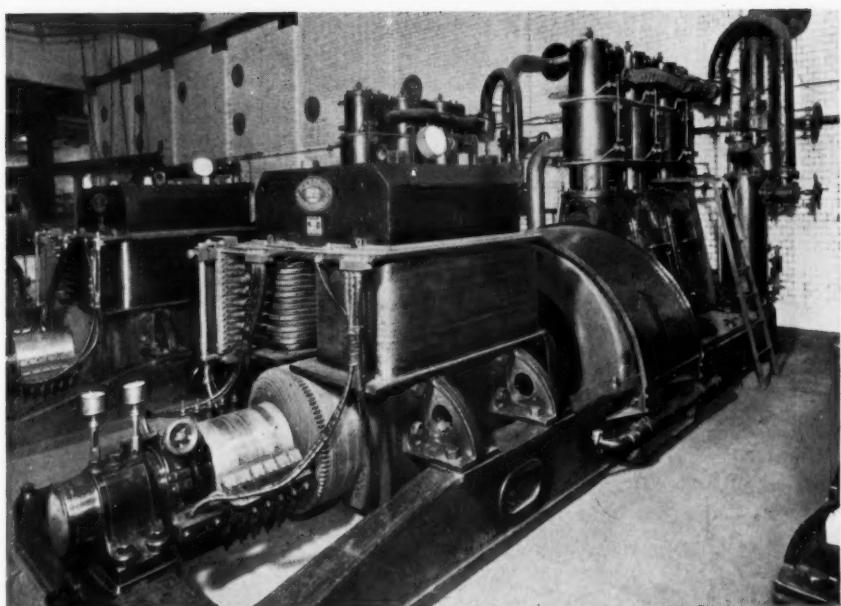
Right : Interior of the old power-house at Waterloo, showing equipment installed in 1898



The old switchboard as used in the Waterloo power house from 1898 until the present modernisation scheme

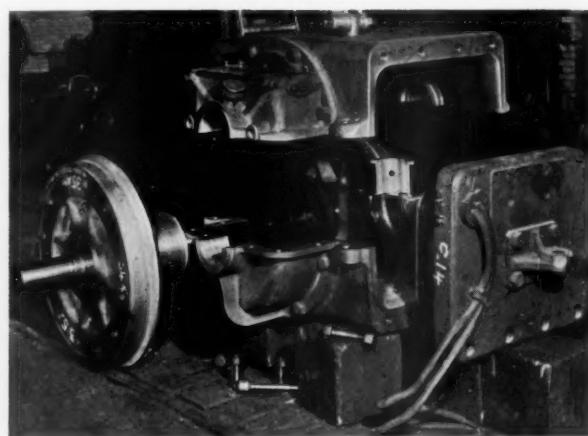


View of the original 200-kW Siemens generators driven by Belliss steam engines at a speed of 380 r.p.m.





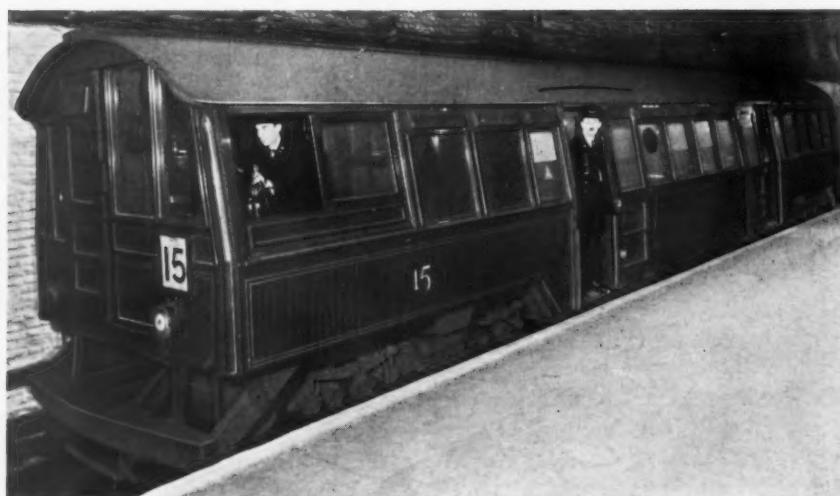
Above : The driving position of one of the Siemens motor-coaches built when the line was opened about 42 years ago. The driver's right hand is on the controller wheel and his left on the air brake handle



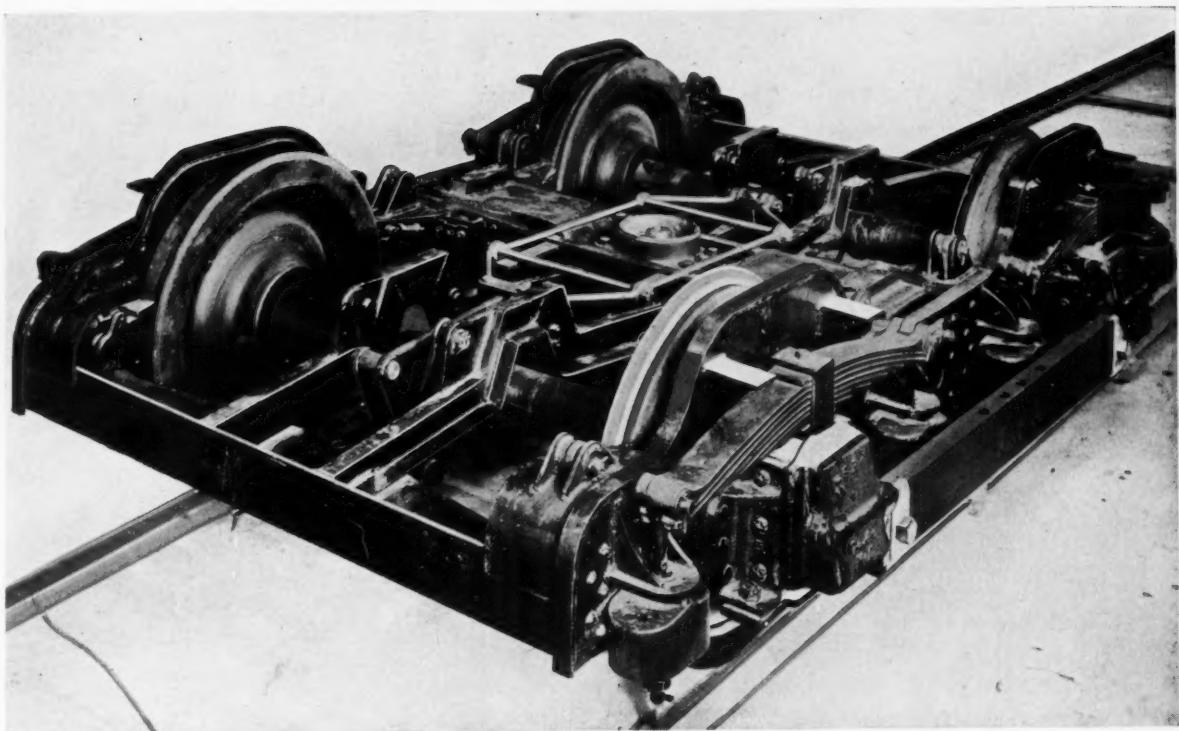
Above : One of the original gearless motors in which the axle formed the armature shaft. The illustration shows a motor with the top half of the casing and the end plates removed



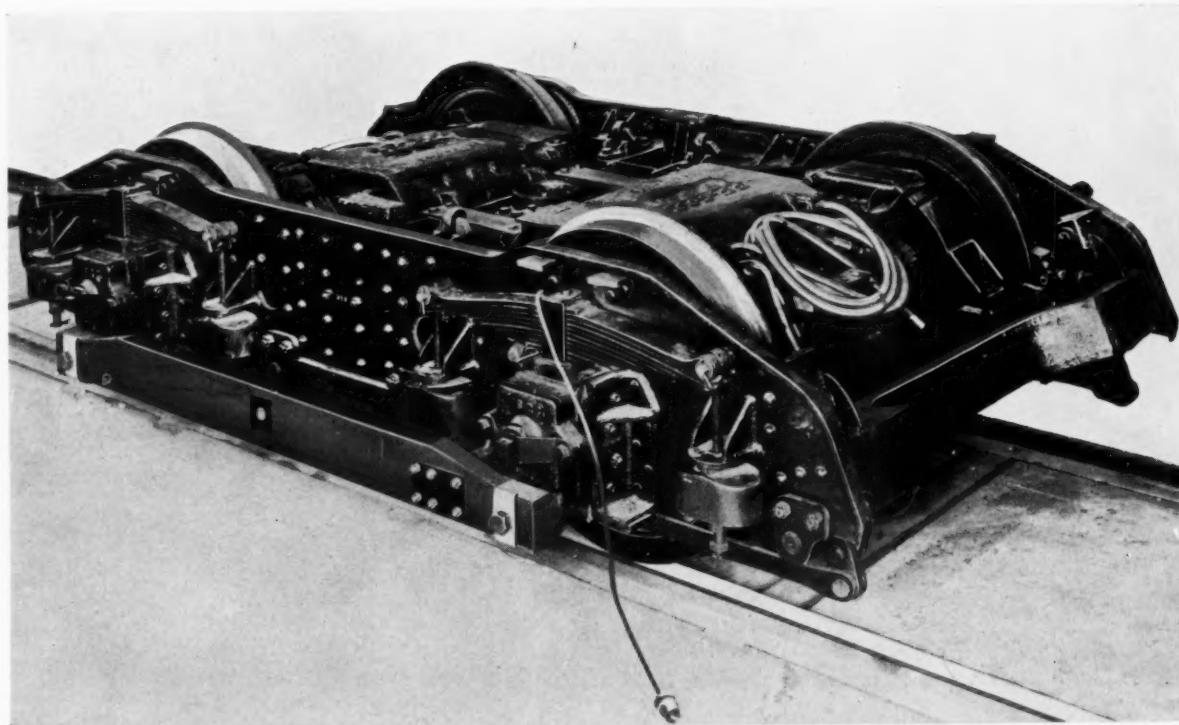
Right : Interior of one of the saloons in the coaches just replaced by modern steel stock



One of the Dick, Kerr coaches built in 1899 and used during non-rush periods as a single-car set

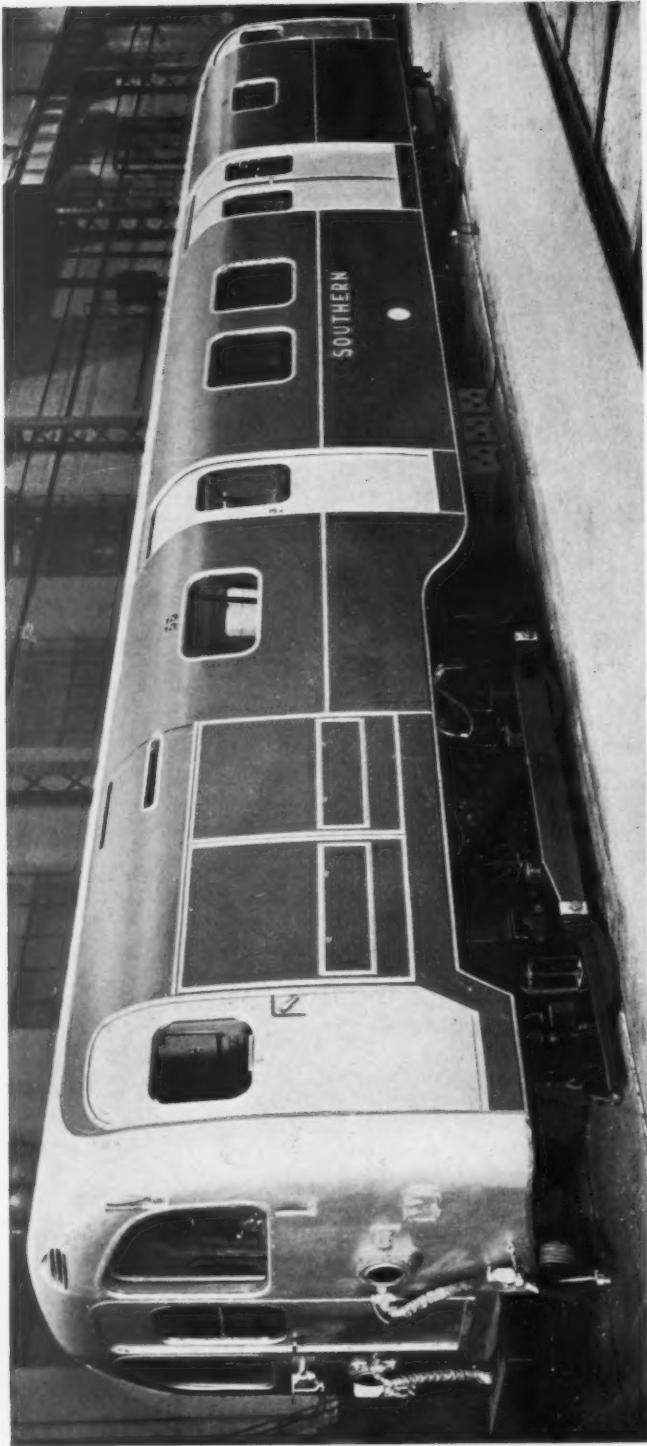


General view of welded trailing truck showing longitudinal frame stays cranked to clear axles, and the tubular brake pull rods surrounding the bogie centre pivot

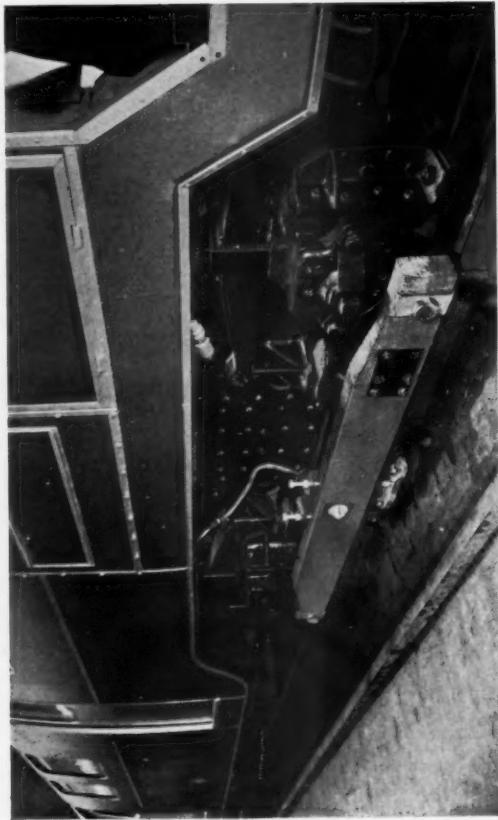


General view of driving bogie with two motors. Like the trailing bogie it has laminated springs having a reverse camber under normal load and with spring hangers cushioned by rubber springs

November 15, 1940



One of the welded-steel motor-coaches in the painting bay at the English Electric works

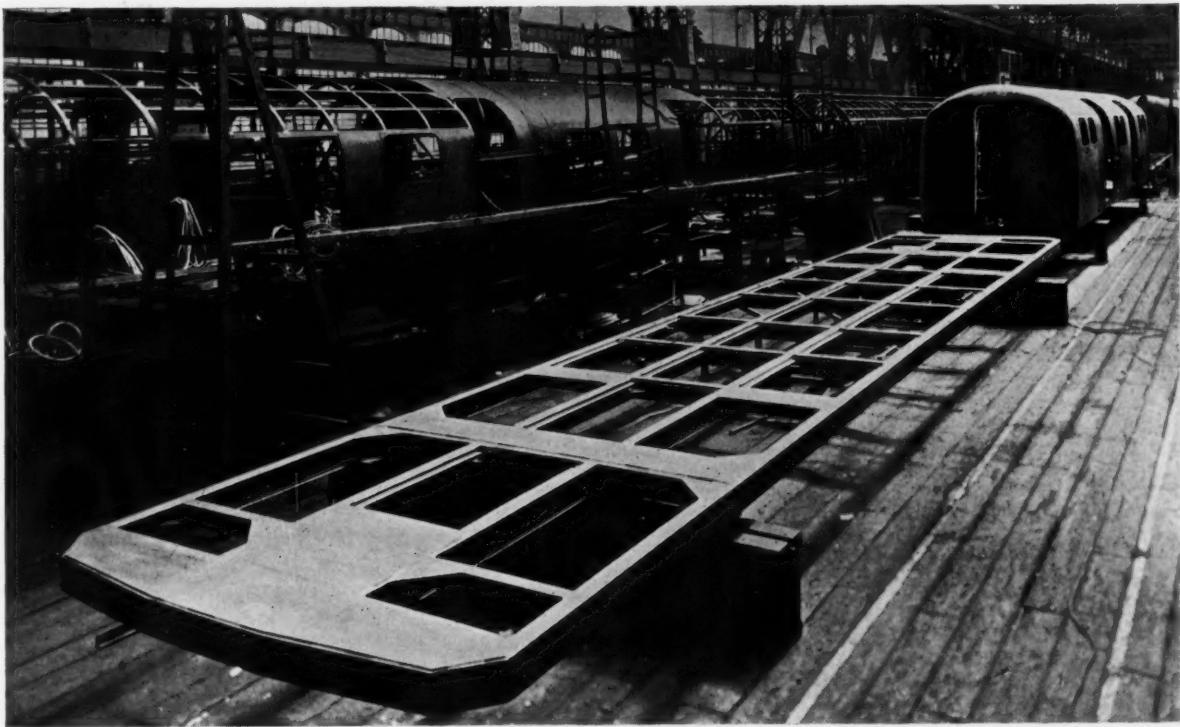


Collector-shoe and beam on driving bogie of motor-coach

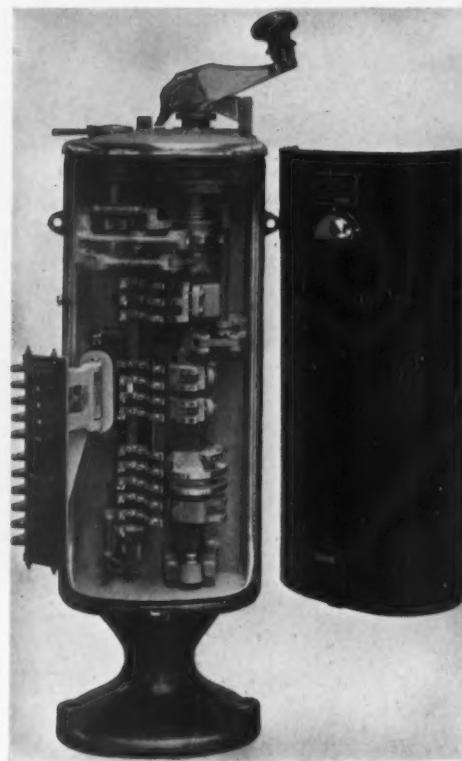
Collector-shoe and beam on trailing bogie of motor-coach



The light and airy interior of the new Waterloo & City stock; contrast with the old stock as shown on the second page of illustrations

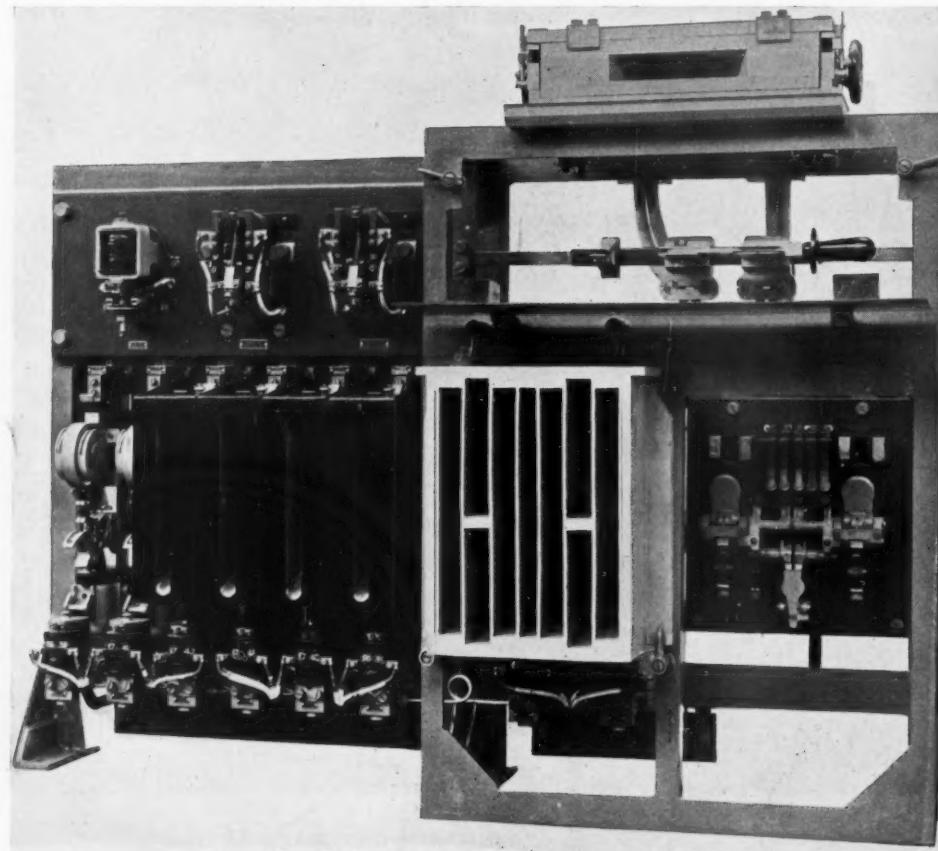


Trailer car underframe and coaches under construction at the English Electric Dick, Kerr works

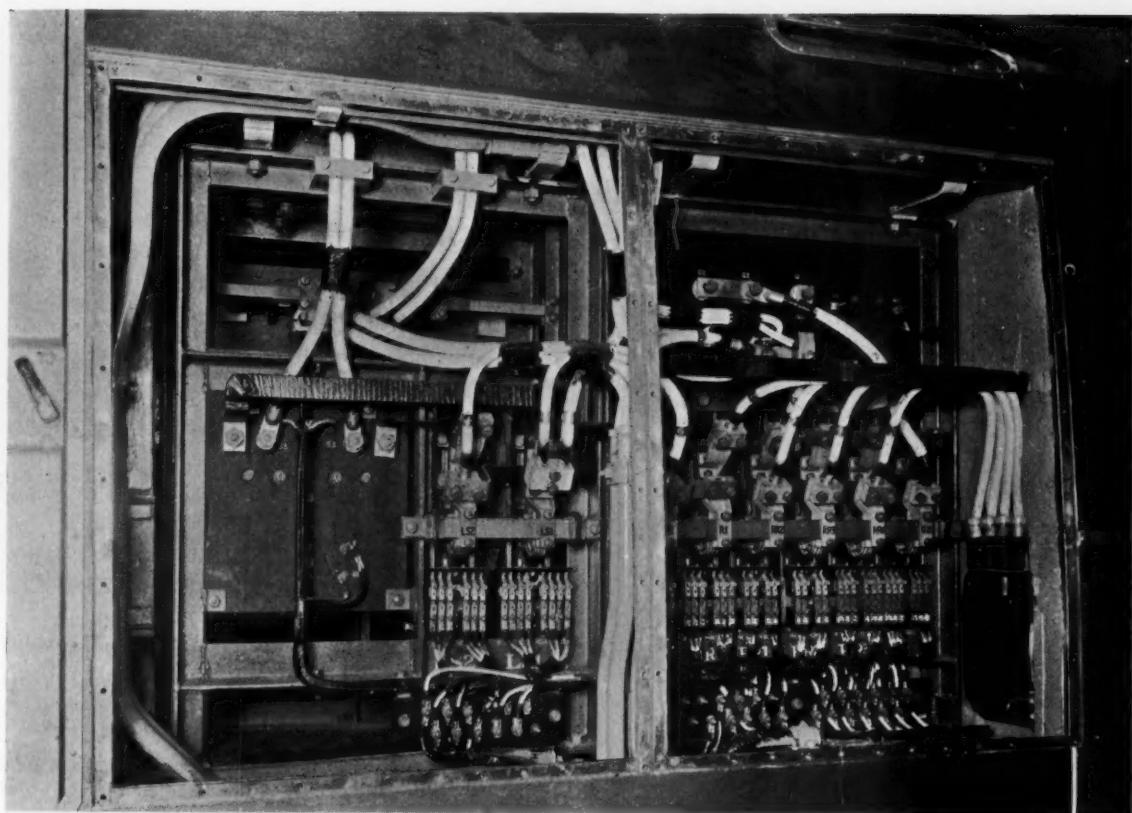


Above : The massive controller embodied in the original stock just replaced. The reversing handle is at the bottom

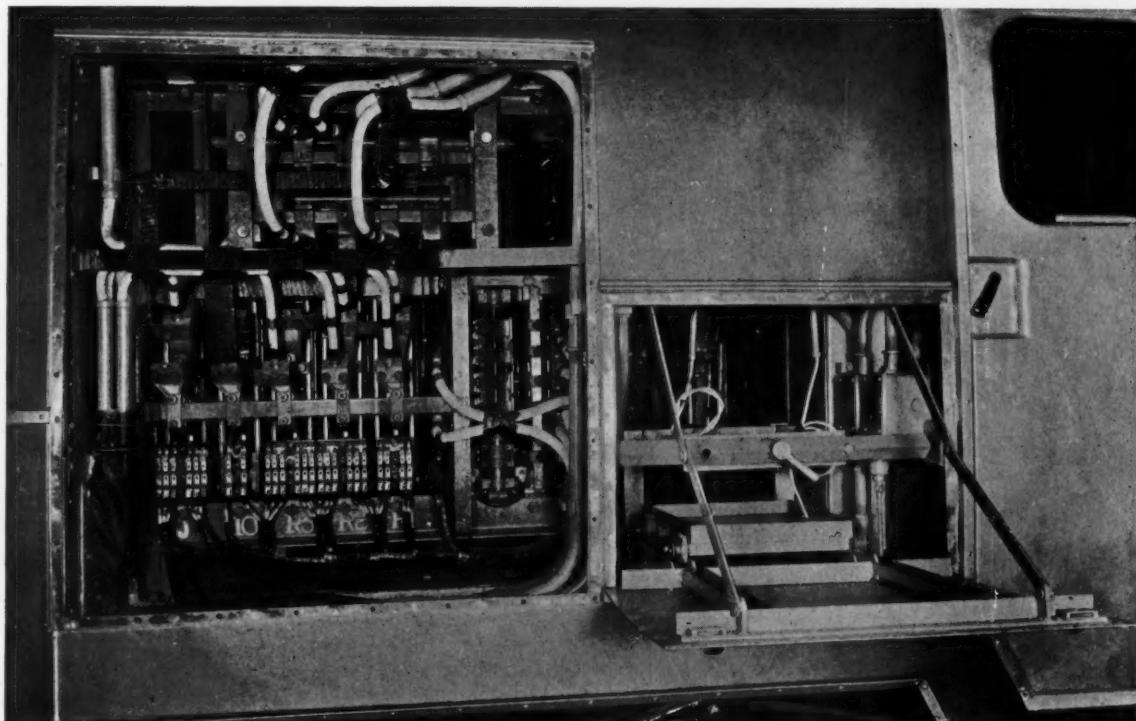
Left : The neat and compact controller, with door off, provided for the new trains, and with the dead-man apparatus operated by depressing the controller handle



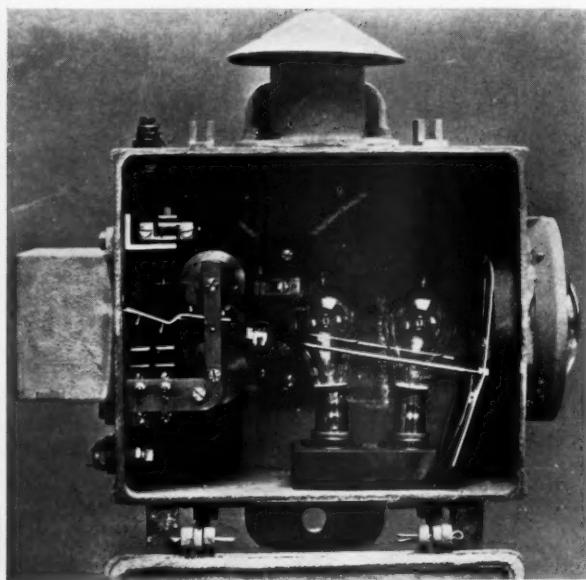
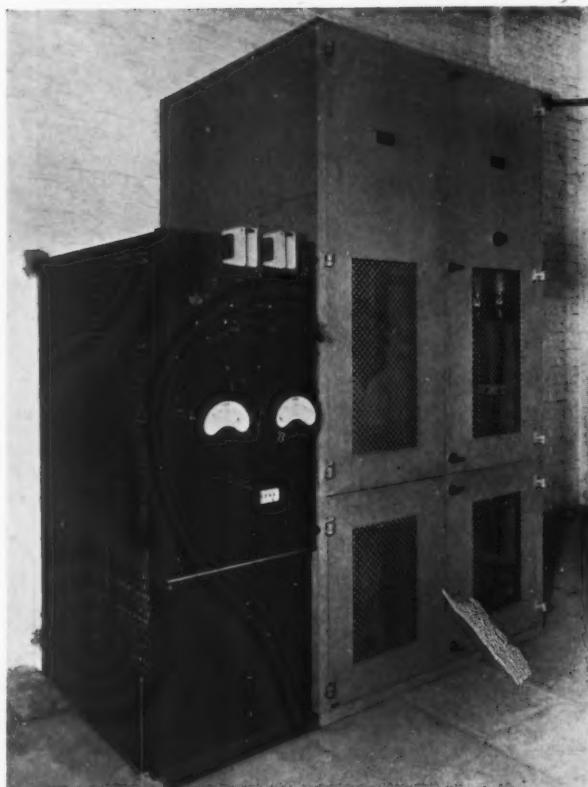
The main equipment frame installed in the new Waterloo & City stock



Side of motor-coach with doors removed to show high-tension equipment

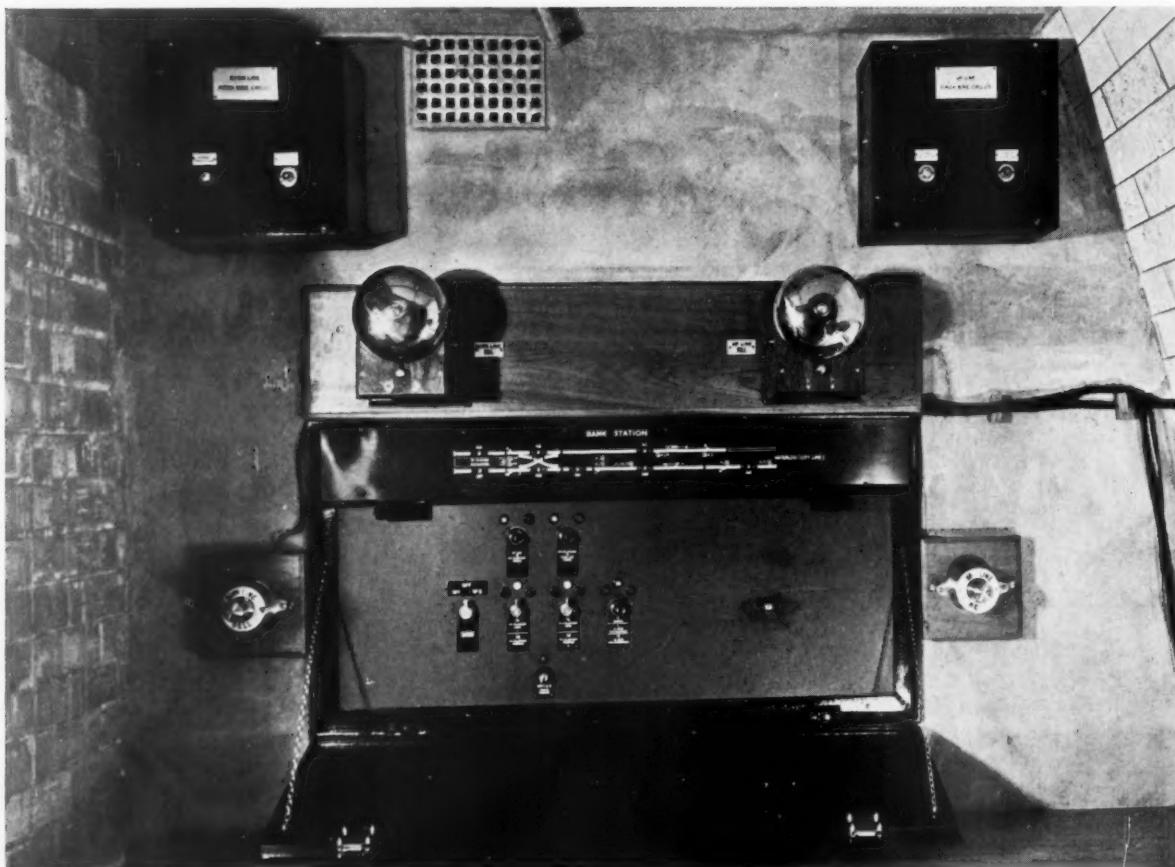


Another view of the electrical equipment installed in the motor-coach; the emergency lighting battery can be withdrawn on rollers as shown on the right of the illustration

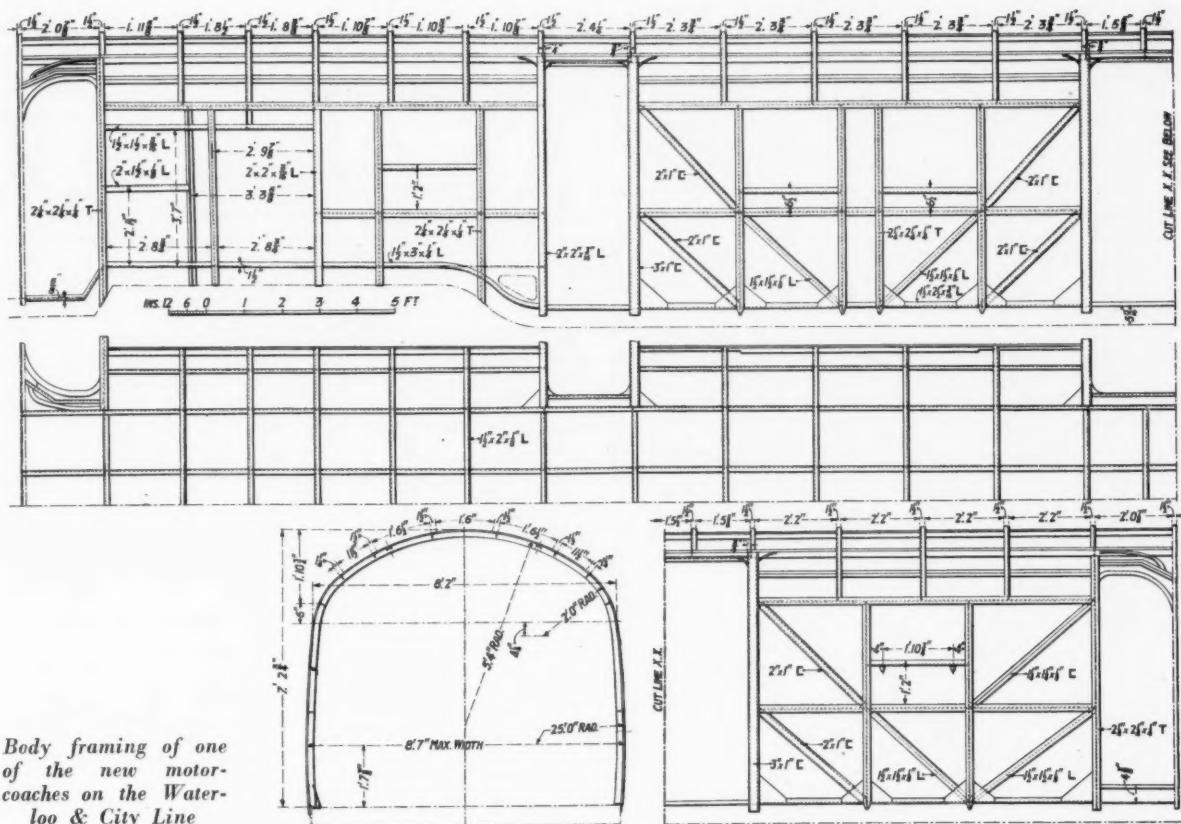


Above : Sykes's electric tunnel signal for the Waterloo & City Railway, 1898

Left : Pumpless rectifier equipment recently installed in the Milk Arch substation



Illuminated panel at Bank station, Waterloo & City Railway



Body framing of one of the new motor-coaches on the Waterloo & City Line

form part of each motor-coach equipment so that the control circuit on each equipment works at a low voltage. The supply to the potentiometer is controlled by the master controller dead-man contacts. The valve coils of all the e.p. contactors and reverser are fed from the low-tension side of the potentiometer at approximately 70 volts.

To meet the requirements of the Ministry of Transport for tube railways, no power bus line is provided through the trains, and so to avoid trouble when passing over gaps in the conductor rail a no-volt relay is fitted to each motor-coach. The operating coil of the relay is connected in series with a resistance and takes its supply from the shoes on its own coach through the control fuse. The contacts of the relay are connected in one of the control wires from the control potentiometer and this ensures that the control supply from certain contactors in a motor-coach is cut off when that coach has its power supply cut off by entering a gap. Thus, when the power supply is again available, a large proportion of the starting resistance has been re-inserted in the motor circuit, and the motors can notch up smoothly, instead of being thrown direct on the line with possibly a heavy current surge.

Train Lighting and Doors

The passenger saloon lighting is supplied at line voltage, there being a number of lamp bulbs in series on each lighting circuit. Half the lights on each coach of a train are fed from the motor-coach at each end. There is a lighting switch on each motor-coach which controls the lights fed from that motor-coach, but there are no lighting switches on the trailer coaches; each trailer coach carries a pair of lighting fuses, one of which protects the circuits fed from each motor-coach.

When a motor-coach forms part of a train, the brake air pipes are coupled up at one end. Electropneumatic switches are provided at each end of each motor-coach to break circuit when there is pressure in the hose coupling pipes and make contact when there is no pressure in the hose coupling pipes. When the motor-coach is disconnected from a train ready to run singly, the electropneumatic switches therefore make contact and connect all the lights on the coach to the same supply.

On the motor-coaches the lighting jumpers are interlocked with lighting switches so that the jumpers cannot be withdrawn from the receptacles with current flowing. Each motor-coach is equipped with a 12-volt battery for emergency lighting in case of a failure of the main supply.

The coaches are provided with electrically-controlled air-operated doors, so that the guard is able to control all the doors on a train from one position. One single and one double passenger door is provided on each motor-coach side and two double doors on each trailer coach side, thus giving ample opening for the rapid loading and unloading of passengers. There is a door control position in each driving cab, and the guard will occupy the position at the rear of the train not occupied by the motorman.

In mechanical design the coaches represent the latest welded steel practice. The underframes are completely welded, but in the bogies and body framing a combination of welding and riveting has been favoured, the bogie, for example, having welded side frames, transoms, and end stays assembled together by riveting. The welded steel outer panels are sprayed on the inside surface with asbestos, and a similar composition is applied to the outside of the inner wood panelling. Corrugated steel covered with maple boards and lino is used for the flooring, and all timber in the cars has been treated with fireproof paint.

Civil Engineering and Signalling

IN connection with the modernisation of the line a number of improvements have been made to the track and to the engineering works. In order to improve the running and to reduce noise, the rails have been welded into 315-ft. lengths by the Boutet welding process, the work being done on the site without removing the rails from the chairs; the number of joints welded was 544, and adjustments were subsequently made to improve the alignment, super-elevation and clearances. The rails used originally weighed 87 lb. a yard, and those now in position are approximately of the same weight. Before welding, the rails were of a maximum length of 45 ft., this being the limit allowed by the lift at Waterloo.

Low Conductor Rail Position

The connections giving access to the berthing sidings at Waterloo have been renewed and altered in order to provide for the increased length of the new trains, and the conductor rails have been renewed and re-positioned from the centre of the four-foot way to the Ministry of Transport standard position on the outside of the track. This has enabled a walkway to be provided in the four-foot, and for this purpose the concrete invert between the longitudinal rail timbers has been filled up with ballast, provision for drainage being retained by a concrete duct below the ballast. It is considered that the ballasting will also materially reduce the noise.

When the new rolling stock is in operation it is proposed to carry out sound tests on a trial length of tunnel with a view to determining the effect of fixing noise-absorbing shields between the lower portion of the coaches and the tunnel walls, and to investigate the most efficient arrangement of the shields.

New lighting has been installed in the tunnels and special arrangements have been made so that the switching on or off of this lighting is semi-automatic in action. A

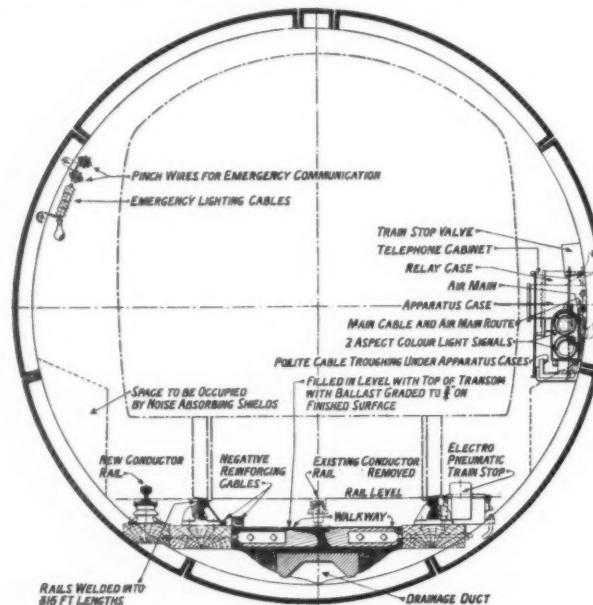
small contactor operated by a relay connected to the conductor rail controls the circuits, and is so arranged that when the traction current is switched off the lighting is automatically brought into use. As a further safeguard, services from two independent supply companies are fed to the circuits through a change-over switch, and visual indication of the position is arranged in the Waterloo signal box, so that if one supply fails the lighting can be thrown over immediately to the other supply company by the signaller.

Other work carried out by the engineering department has been the building of three booking offices at Waterloo and one at Bank station; and the erection of new barriers and ticket collectors' boxes at Waterloo. Powers have been obtained for the construction of escalators at Bank station and for a low-level subway giving direct access to the L.P.T.B. Central Line, but this work has been deferred for the present.

Signalling

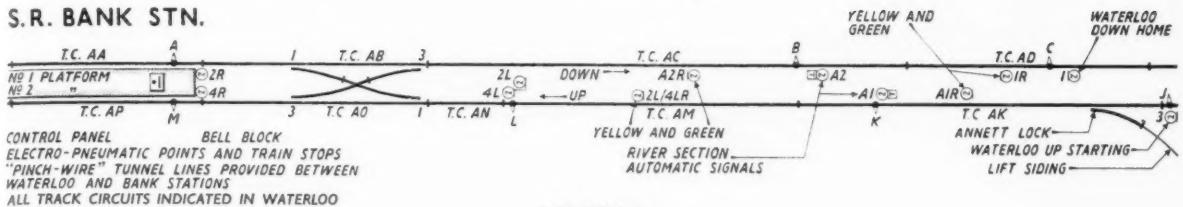
The Waterloo and City Railway was from the first peculiar in having only two stations, but was long enough to necessitate an intermediate signalling point. The company invited J. P. Annett, then Signal Superintendent of the London & South Western Railway, and W. R. Sykes, the well-known signal engineer and inventor, to advise on the arrangements to be adopted. The scheme they designed was, in one fundamental respect, the reverse of that then in use on the City & South London, opened some years earlier, advanced starting signals being used instead of outer homes, the intermediate section being put under the control of the signal box in the rear, an arrangement now much favoured. Sykes's lock-and-block was installed, but the brush treadle of the older tube was replaced by depression-type treadle bars, so arranged as not to transmit the block instrument release until the whole of the train had passed. A breakaway was regarded as practically impossible. From this arrangement was later developed the "last-vehicle" treadle still found on the Southern Railway.

The semaphore starting signals at the stations and a few ground shunts were mechanically worked, as were the points, but the signals in the tube itself were electrical, being specially designed by W. R. Sykes to suit the restricted conditions of space. They consisted of a case carrying a lens, behind which was a pair of electric lamps. A light spectacle frame containing the coloured glasses was moved between lens and lamps by a Z armature electro-magnet, energised by reversing the relative signal lever. This mechanism was really a forerunner of the searchlight signal of today. Pilot lamps in the signal boxes detected the burning of the signal lamps but the movement of the spectacles was repeated by ordinary type signal repeaters. The advanced starting signals—officially called the river section signals—were at first placed not far beyond the sharp curves on both sides of the Thames and the drivers did not have a good sight of them. Therefore, to advise them, on leaving City or Waterloo stations, whether the river signal was already off or not, draw-ahead type arms were provided below the starting signals, and were governed by Sykes's electric selectors, so circuited that if the starting signal lever was reversed with the river signal on, the draw-ahead arm would be lowered. The lowering of the starting signal arm therefore indicated that the river signal was off. In practice, with the equip-



Cross-section of tunnel showing in position the new conductor rail and other fittings, and an outline of the new rolling stock

S.R. BANK STN.



LOCKING

No.	Description	Released by			Approach Locked by Track Circuits Occupied	Backlock Released by	
		Interlocking	Track Circuits	Detection		Track Circuits	Train Stops "On"
1.	Up Line to No. 1 Platform Points.	2L.2R.3.4L.4R.6L.6R.	AB.AN.AO.	IR.3.	AM.	AB.AN.AO.	A.L.
2L.	No. 1 Platform Home.	IR.2R.3.4L.4R.6L.6R.	AN.AO.AB.AA.	1.3.	AA.	AB.AN.AO.	A.
2R.	No. 1 Platform Starting.	1.2L.3.4R.6L.6R.	AB.AC.				
3.	No. 2 Platform to Down Line Points.	1.2L.2R.4L.4R.6L.6R.	AB.AN.AO.	1.3.	AM.	AB.AN.AO.	L.M.
4L.	No. 2 Platform Home.	1.2L.3.4R.6L.6R.	AN.AO.AP.	1.3R.	AP.	AB.AN.AO.	M.
4R.	No. 2 Platform Starting.	1.2L.2R.3R.4L.6L.6R.	AO.AB.AC.			AB.AN.AO.	A.L.M.
6L.	AutoWorking A1 No. 2 Platform only	1.2L.2R.3.4L.4R.6R.					
6R.	AutoWorking A2 Nos. 1 & 2 Platforms	1.2L.2R.3.4L.4R.6L.					

During conditions of automatic working, Interlocking, Track Circuit Controls, etc., remain operative, but Switches 1, 2, 3, 4 are inoperative.

TRAIN STOP CONTROLS

Train Stop	When Signal Used	Held in Clear Position by Track Circuit Occupied	AUTOMATIC SIGNAL CONTROLS				
			Signal A1 and Train Stop K controlled by Track Circuits AM. AN. "A2" "B" "C" Circuit AD.				
			Track Circuit AM will not clear until Signals 2L & 4L at Red, 2L/4LR at Yellow, Train Stop L "on" or Track Circuits ahead clear.				
A.	2R.	AB.	Track Circuit AD will not clear until Waterloo I at Red, IR at Yellow, Train Stop C "on" or Track Circuits ahead clear.				
A.	2L.	AN.AO.AB.	Track Circuit AC will not clear until Signals A2 at Red, A2R at Yellow, Train Stop B "on" or Track Circuit ahead clear.				
L.	2L. or 4L.	AN.					
M.	4L.	AN.AO.					
M.	4R.	AO.					

A.I. AUTOMATIC WORKING

(NO. 6 SWITCH IN LEFT HAND POSITION)

Cycle of Operation

Train in No. 2 Platform, all points normal and signals "on."
After track circuit AP has been occupied for 1 minute No. 3 points operate to reverse and signal 4R clears.
Train leaves No. 2 Platform.
When train clears track circuit AB, No. 3 points operate to normal and signal 4L clears.
Second train enters No. 2 Platform.
After track circuit AP has been occupied for 1 minute No. 3 points operate to reverse and signal 4R clears, and cycle of operation is repeated.

An emergency push button is provided to restore all train stops and signals to the danger position.

An approach lock release push button is provided to release approach locking on signals after a time interval of 1½ minutes.

After a signal and its associated train stop have cleared no movement of points is possible until train has passed completely over the track circuits controlling the points.

A.2. AUTOMATIC WORKING

(NO. 6 SWITCH IN RIGHT HAND POSITION)

Cycle of Operation

Train in No. 1 Platform, all points normal and signals on.
Signals 2R and 4L clear.
First train leaves No. 1 Platform.
Second train enters No. 2 Platform.
When track circuit AA is clear and AP has been occupied for 1 minute, No. 1 points will operate to reverse and signal 2L clears.
Third train enters No. 1 Platform.
When track circuit AA has been occupied for 1 minute, No. 1 points operate to normal, and No. 3 points to reverse, then signal 4R clears.
Second train leaves No. 2 Platform.
When track circuit AP has been clear for 1 minute No. 3 points operate to normal, and signals 2R and 4L clear.
Third train leaves No. 1 Platform.
Fourth train enters No. 2 Platform.
Cycle of operation is repeated.

OPERATION OF AUTOMATIC CONTROL SWITCH

To change from manual operation to either automatic A1 or A2, switch must be operated when all points and signals are normal, the platform track circuits being occupied or clear.

To change from automatic A1 or A2 to manual operation, operate switch within 1 minute of either track circuit AA or AP becoming occupied by a train entering the platform.

ment as first arranged, it also meant that the line was clear into the other terminus, since the signalman was unable to plunge his Sykes instrument and free the river signal in the rear without first pulling off his platform home signal. This feature was soon modified as being too restrictive to traffic, and a train was allowed to be accepted when the

preceding one had arrived in the station. The river signals were also moved further out to give drivers a better sight of them; the draw-ahead arms being eventually removed.

Another interesting feature of the original signalling was an early form of A.T.C. It was at first proposed to have dead third-rail sections in the vicinity of any signal at

danger, but the idea was abandoned as being difficult to carry out without much complicated equipment. Short lengths of insulated rail, called slipper bars, were therefore provided outside the track at each signal, connected to a switch on the latter closed in the on position. When a contact wiper on the train touched a slipper bar in such circumstances a release coil in the driver's cab was energised, tripping the main switch. This apparatus, although working on the open circuit principle, is understood to have given satisfaction. A liberal use of Sykes depression bars in platform lines and sidings, with electric point detectors and other accessories, rendered the signalling system remarkably complete for its day. There was no emergency releasing key for the block instruments. Save for minor modifications, the whole of the apparatus, including the A.T.C. device, remained unchanged until the recent resignalling, and has functioned exceedingly well throughout the 40 odd years. The electrical part was constructed by W. R. Sykes and the mechanical part by the Railway Signal Co. Ltd. of Liverpool.

New Signalling Equipment

The new signalling is well illustrative of the progress made in this respect since the line was opened and of the present trend of signalling methods in this country. Track circuits are provided throughout, of the condenser-fed type with 2-element vane relays, with 2-aspect colour light signals and repeaters, electro-pneumatic train stops, and—at Bank station—point mechanisms. The existing signalbox at Waterloo has been retained, but the lever frame, which is of the ground pattern, has been fitted with electric locks and circuit controllers in accordance with present Southern standard practice. Point operation remains mechanical, with electric detection. At Bank, however, the original signalbox has been abolished and a panel apparatus installed in a new relay interlocking room near by. This installation, shown on the accompanying diagram, can be worked by hand at any time, should circumstances necessitate, but is normally arranged so that the crossovers and signals work automatically as trains arrive and depart. A three-position master switch on the panel selects the type of automatic working required. When it is turned to the left No. 2 platform line only is in use. One minute after an incoming train has passed into it, clear of the crossover road, the points reverse and the starting signal clears, provided of course that the section of line which that signal governs is clear. When the train has left and passed completely over to the

down line the points are restored to normal and the home signal is again cleared for the next up train. This sequence continues as long as the master switch remains in the left hand position. Should it be turned to the right then both platform lines are brought into use, the sequence of automatic movements being similar in principle to those just described, except that after a train has arrived in No. 2 line the next is admitted into No. 1, after which the train in No. 2 line is signalled out, and so on, as explained on the diagram. Manual working is thus only necessary when it is desired to depart from the automatic sequence. The panel also has an emergency push button, which will put all the Bank signals and train stops to danger, should some mishap or irregularity require it.

The alternative platform working has been provided to facilitate handling the traffic under differing conditions of morning and evening peak periods. During the former, the main flow of passengers is towards the Bank and No. 2 platform only is used, as the short time passengers take to detrain permits a train to reverse and clear the station without checking the following one. During the non-peak hours this working is also satisfactory. For the homeward evening period both platforms are used, in order that a train may usually be found waiting ready to receive passengers. The panel apparatus has a hinged cover over the thumb switch portion, which may be left closed while automatic working is in force, the illuminated diagram being then alone visible. There is single-stroke bell communication for both lines, with the usual telephone facilities. To guard against the remote contingency of a point mechanism control valve being operated irregularly the drive rod of the mechanism is locked by a plunger controlled by an entirely separate circuit. Should a signal lamp fail, or a signal itself not go to danger behind a train, or a train stop fail to return to the tripping position, the signal in the rear is held at danger until the fault is rectified or the section ahead of the failed apparatus is proved clear also. Train stop and point mechanisms are of the latest compact design used on other London tube lines. At Waterloo the ground signals which formerly showed coloured lights, have been altered to the floodlit type. There are now no shunt signals at the Bank.

As a further safety measure, pinch wire communication has been provided throughout both tunnels. Bringing the two wires in contact automatically cuts off the traction feed to the third rail. The same result follows the clipping to the wires of a hand telephone set carried on each train, with which the motorman can then speak to the substation.

Contractors

English Electric Co. Ltd. . . .	Complete new trains	Northern Aluminium Co. Ltd. . .	Aluminium panels and sections
Asea Electric Limited . . .	Remote control equipment	British Aluminium Co. Ltd. . .	do. do.
British Thomson-Houston Co. Ltd. . .	Power supply switches	George Spencer, Moulton & Co. Ltd. . .	Rubber draw, and auxiliary springs
General Electric Co. Ltd. . .	11-kV switchgear	Beckett, Laycock & Watkinson Limited . .	Windows
Pirelli-Geneval Cable Works Limited	Pumpless rectifier equipment	I.C.I. (Rexine) Limited . .	Rexine for interior finish
Westinghouse Brake & Signal Co. Ltd.	H.T. and L.T. cables	Triplex Safety Glass Co. Ltd. . .	Curved Triplex glass
B. A. Holland Engineering Co. Ltd.	Air-brake equipment	Ferodo Limited . .	Ferobestos pads on bogies
G. D. Peters & Co. Ltd. . .	Signalling equipment	Pritchett & Gold and E.P.S. Co. Ltd. . .	Nife batteries and switches
Lightalloys Limited . . .	Air-brake compressors	Clifford & Snell (England) Limited . .	Loudaphones
Meech Electric Drives Limited . . .	Air-operated door gear	W. R. Sykes Interlocking Signal Co. Lt-l.	Test cases and tunnel telephone cabinets
	Wedgelock couplers		
	Alpax doors and other fittings		
	Drainage pump system		

RAILWAY NEWS SECTION

PERSONAL

Sir Ronald W. Matthews, Chairman of the L.N.E.R., has accepted the Presidency of the Railway Convalescent Homes for the year 1941, in succession to Mr. Robert Holland-Martin.

Mr. Ernest Bevin, Minister of Labour & National Service, has appointed Mr. H. G. Gee to be his Principal Private Secretary in place of Mr. E. A. Hitchman, who has been transferred to other duties.

L.M.S.R. APPOINTMENTS

The following appointments have been approved by the directors of the L.M.S.R. :—

Mr. F. O. Bates, Solicitor Assistant (Common Law), Headquarters, to be Senior Common Law Assistant, Headquarters.

Mr. C. Anstall (Goods Station Development Section), Chief Operating Manager's Office, Headquarters, to be Assistant to District Goods Manager, Manchester.

Mr. R. M. Wells, Ancoats, to be Assistant to District Goods Manager, Leeds.

Mr. W. Goodwin, Liverpool Road, to be Goods Agent, Ancoats.

Mr. A. R. Maxwell, Stockport, to be Goods Agent, Liverpool Road.

Mr. R. A. Blood, Chief Clerk, Liverpool Road, to be Goods Agent, Stockport.

Mr. C. E. Fry, Huddersfield, to be stationmaster, Leicester.

Mr. O. Best, Wellingborough, to be stationmaster, Huddersfield.

Mr. V. L. Ward, Luton, to be stationmaster and Goods Agent, Wellingborough.

Mr. C. B. Bunker, Rushton, to be stationmaster, Luton; also in charge of Luton (L.N.E.R.).

We regret to record the death, on November 3, of Captain Robert G. Latta at his home at Heswall, Cheshire, aged 68. Captain Latta was a former General Manager of the Canadian Pacific Steamship Company and a former Commodore of the fleet owned by that company. He joined the C.P.R. in 1904 and in 1931 was appointed to the command of the *Empress of Britain*, flagship of the line. Before becoming General Manager in 1936, when he succeeded Captain James Gillies, Captain Latta had been General Superintendent of Steamships for the company at Montreal. He retired in 1938.

We regret to announce the death, on November 9, at Hove, of Lieut.-Colonel Sir Charles Morgan, C.B.E., a Director of the Southern Railway, and formerly Chief Engineer of the London Brighton & South Coast Railway. Charles Langbridge Morgan was born at Worcester on January 1, 1855, and after serving a pupillage beginning in 1870 under the late Mr. Edward Wilson, in which connection he was associated

out on the system under his direction, among the most important being the new line from Coulsdon to Earlswood which freed the company from dependence on the South Eastern line through Redhill on its main route to Brighton. The reconstruction of Victoria station, the widenings by which four running lines were provided continuously between London and Balcombe tunnel, and numerous other improvements were all carried out under Sir Charles Morgan's regime. On his retirement in 1917 he was appointed a Director of the company, and in that capacity was selected to be one of the Directors of the Southern Railway upon its formation under the Railways Act of 1921. During the last war, Sir Charles Morgan rendered many special services. On March 3, 1917, he was gazetted Deputy Director of Railways and served in Italy and France on special engineering duties on behalf of the War Office. Afterwards he was a member of the Disposals Board. In January, 1918, he was made a Commander of the Order of the British Empire and was knighted in 1923. Sir Charles Morgan was a member of the Institution of Civil Engineers and was its President in 1923. He was also a Commissioner of the Newhaven and Seaford Sea Defences.

Mr. William Henry McMenemy, engineering manager of Cammell Laird & Co. Ltd., has been appointed to a seat on the board.

The London Passenger Transport Board announces that Mr. J. P. Thomas has been appointed to assist the board in dealing with problems that have arisen out of the use of tube stations as air raid shelters. He will be the channel of communication between the board and the Government departments and local authorities concerned. Mr. Thomas was General Manager of London Transport railways until he retired in 1938.

INDIAN RAILWAY STAFF CHANGES
Mr. H. M. R. Morse has been appointed to officiate as a Divisional Superintendent on the N.W.R., as from August 16.

Dr. C. D. Newman has been confirmed as Chief Medical Officer, E.B.R.

Mr. H. J. Allinson has been confirmed as Chief Electrical Engineer, E.I.R.

Rai Bahadur A. Bholanath has been appointed to officiate as Deputy Traffic Manager, E.B.R., as from July 4.



The late Sir Charles L. Morgan, C.B.E.

A Director of the Southern Railway Company and Chief Engineer of the L.B. & S.C.R., 1896-1917

with many of the new works then in hand on the Great Eastern and Great Western Railways, was from 1877 to 1883 Chief Engineering Assistant to the firm of E. Wilson & Co. During that time he acted as Resident Engineer on the construction of the Banbury & Cheltenham Railway. In 1883 he was appointed Chief Engineering Assistant to Mr. John Wilson, then Chief Engineer of the Great Eastern Railway, and was thus associated with most of the engineering works carried out by the company, until in February, 1896, he was appointed Chief Engineer of the L.B. & S.C.R., and of the Newhaven Harbour Company, a position he occupied for 21 years. During that period extensive engineering works were carried

TRANSPORT SERVICES AND THE WAR—64

Faster trains in daylight air raids—Season ticket Concessions for juveniles—Closed L.N.E.R. branch lines—Salvage collecting on G.W.R.—L.P.T.B. medal for bravery—Tunnels as shelters—Strategic railways in the Middle East

The Minister of Transport has made certain modifications in the restrictions on the speed of trains during air raids. In future, except during blackout hours passenger trains may be driven at a maximum speed of 25 m.p.h. This compares with the previous maximum speed of 15 m.p.h. Braked goods trains may also travel at a maximum speed of 25 m.p.h. whereas previously the limit was 10 m.p.h. The maximum speed for other goods trains which hitherto has been 10 m.p.h. is raised to 15 m.p.h. It is no longer the practice to change the headlamps of trains on receipt of a warning.

Weekly Season Tickets for Juveniles

Weekly season tickets at half rate are to be issued to juveniles earning up to 25s. a week. The Railway Executive Committee has recommended this concession to meet wartime increases in the cost of living, and the Minister of Transport has authorised that it shall operate from December 1.

Hitherto half-rate season tickets have been available for a minimum period of a month to juveniles under 16 years or to applicants under 18 who were not earning more than 18s. a week. Under the new concessions half-rate season tickets will be made available for juveniles up to the age of 18 earning up to 25s. a week. Applicants have to present a certificate signed by their employer.

Railway Air Services—New Winter Timetable

Railway Air Services put into operation a new winter timetable on November 11 which provides a service each way on every weekday between Glasgow and Belfast, leaving Glasgow Air Port at 9.30 a.m. and returning from Belfast Airport at 3.5 p.m. The service between Liverpool and Belfast leaves Liverpool at 1.15 p.m. and from Belfast at 10.45 a.m.

Passengers on these services must be in possession of valid passports or exit permits. Freight traffic for conveyance on these routes will be accepted at any railway station.

Gift Towards Purchase of Aircraft

The Minister of Aircraft Production has acknowledged the receipt of £4 14s. 1d. from the stationmaster and staff of Aldgate East station.

Closing of L.N.E.R. Branch Lines

We are indebted to the L.N.E.R. for having supplied us with the following information concerning branch lines in the company's Southern Area closed to passenger traffic since the outbreak of war. In a number of cases it will be noticed that services have subsequently been restored. These closures are, of course, entirely independent of temporary suspension of service as the result of war damage:—

Branch or section	Date of closing	Date of reopening
Woodhall Jc. and Horncastle	10/9/39	4/12/39
Firby and Spilsby	10/9/39	—
Louth and Bardney	10/9/39	4/12/39
Hertford (North) and Hitchin	10/9/39	—
Forres and Wymondham	10/9/39	—
Maldon East and Woodham Ferrers	10/9/39	—
Finsbury Park and Broad Street	10/9/39	4/12/39
Kings Cross and Moorgate widened	10/9/39	1/1/40
Lines		
Derby-Burton	3/12/39	—
Derby-Stafford	—	—

In the North Eastern Area no service has been given at Seaham Harbour since the emergency timetable came into operation on September 11, 1939, but no other branch lines in the area have been closed to passenger traffic as a result of the war.

In the Scottish Area no branch lines have been closed to passenger traffic as a result of the war.

War Effort of Small L.M.S.R. Station

The small station at Grayrigg, Westmorland—familiar to students of locomotive performance as marking the top of the first stage of the climb from Carnforth to Shap summit—was recently awarded a dartboard by the L.M.S.R. management for the efforts of the staff in the salvage of scrap. Mr. Mason, the stationmaster, with the porter who assists him, auctioned their prize among the 163 inhabitants of the village, and raised £20 for Red Cross funds.

Salvage on the Great Western Railway

As the result of recent investigations into salvage problems on the Great Western Railway, measures have been taken to ensure the maximum recovery of all scrap materials so as to make them available for the nation's war effort. The procedure for the recovery of scrap by the large engineering departments was already well defined, but special steps have been taken to make sure that no single item capable of further use is overlooked. The discovery and collection of waste materials which accumulate on the premises of the company in all parts of its system, however, needed different treatment, particularly as many materials formerly regarded as rubbish have assumed a new significance in the war economy. As an essential corollary to the success of the scheme which has been formulated, the active co-operation of the whole of the staff of approximately 100,000 has been enlisted. It will constitute a salvage corps whose members will, under the inspiration of local salvage leaders, and as part of their ordinary duties, see that all waste materials which come under their notice are collected and deposited in properly appointed places. Dumping grounds are being provided at suitable points at the larger stations, docks, depots, and offices, giving separate accommodation for (1) iron and steel, and brass; (2) sacking and rags; (3) tins; (4) miscellaneous scrap; at small stations a mixed dump will suffice.

Special salvage vans are being provided to make regular calls at the principal stations and proceed, when loaded, to



One of the special salvage vans provided by the G.W.R. for the collection of scrap materials from all parts of the system and its transfer to the nearest stores depot

the nearest stores depot—of which there are five—for resorting and disposal of the contents. Each van is fitted with four bins.

L.P.T.B. Medal for Bravery

The London Passenger Transport Board has decided to institute a medal which will be awarded to members of the staff of the board who show conspicuous bravery in the discharge of their duties. The medal will be known as the London Passenger Transport Board medal for bravery. In THE RAILWAY GAZETTE of August 23, we recorded the institution by the Southern Railway of a medal which has already been awarded to a number of the members of the staff of that company for meritorious service.

Lord Ashfield in a message to all members of the staff announcing the institution of the medal, said that since the "Battle of London" began London Transport services had been subjected to unprecedented strain, but thanks chiefly to the energy, resource, and devotion to duty of the staff, they have withstood the test well and millions of passengers have been carried safely to and from their work every day. On behalf of his colleagues on the board, as well as of himself, he thanked the staff for the gallant and spirited way in which it had faced the difficulties and dangers of the last few weeks, and had contributed in no small measure to the great and paramount task of winning the "Battle of London."

"You may feel proud of your efforts and I am particularly happy to know, from communications made to the board, that many of our passengers would wish to be associated with this expression of congratulation and gratitude. Some of you have shown especial courage in carrying out your duties and have saved both life and property" he said.

Central London Tube Extension Shelter

Leyton Borough Council are installing some 2,000 bunks in tiers of four in part of the Central London tube extension eastwards of Liverpool Street which is being used as an air raid shelter. As has previously been recorded in THE RAILWAY GAZETTE, work on the extension has been suspended.

Glasgow Tunnel Shelter

Work is to proceed immediately on the conversion of an old railway tunnel in Glasgow for use as a deep-level air raid shelter, providing accommodation for 700 persons. The decision was taken on October 29 by the Emergency Committee of the Glasgow Corporation. This tunnel was used at one time as a rifle range and more recently has provided a training place for the Home Guard.

Merseyside Tunnel Air Raid Shelter

At a meeting of the Liverpool City Council on Wednesday, October 30, it was stated that a lower section of the Mersey road tunnel, lying between the entrance and the first ventilating shaft, may be used as an air raid shelter, providing accommodation for 1,500 persons in bunks. A section of the tunnel on the Birkenhead side may also be used in a similar way. We gather that the matter is still under consideration by the Mersey Tunnel Joint Committee. A problem is presented by the fact that at present there is no access to the lower section of the tunnel excepting through a man-hole.

Travel Bulletin Broadcast Refused

London Passenger Transport Board recently suggested to the British Broadcasting Corporation that it should broadcast early morning "travel bulletins" advising travellers how to get to their places of business. The object was to save passengers fruitless journeys to their stations if their customary services were interrupted or suspended. The suggestion was declined by the B.B.C. as it was considered unadvisable to make such broadcasts on the grounds that it would afford information to the enemy as to how and where his bombs had affected transport systems during the previous night.

Repairing Bomb Damage in London

More than 1,800 skilled railwaymen and dock workers, members of a Royal Engineers unit, who have technical and practical knowledge, are now employed removing debris and repairing pipe lines in London thoroughfares. These men are

members of a Supplementary Reserve unit which was founded in 1938. On the outbreak of war, it was the first unit to enter France and the last to leave after the capitulation of the French Army.

Evacuees to Northern Ireland

Free travel vouchers are being issued from Greater London and certain coastal towns to evacuee mothers and children who are being moved to Northern Ireland under the arrangements made between the Governments of Great Britain and of Northern Ireland. Applications for the vouchers have to be made by those living within the L.C.C. area to the London County Council Divisional Offices; those outside that area apply to the Local Education Office. In both cases evidence must be produced that arrangements for lodging in Northern Ireland have been made. Evacuees are responsible for their own arrangements for the journey. Passports, travel permit cards or exit permits are not required for evacuee mothers with children travelling to Northern Ireland under this scheme. The arrangements made do not apply to Eire, but the Ministry of Health states that details of a similar scheme for that country are being worked out with the High Commissioner.

Canal Traffic in Belgium

A steady increase in the mileage of inland canals open to traffic is reported from Belgium. Under orders from the German authorities, an inland shipping organisation of all owners operating barges of 50 tons and over has been established, with headquarters in Antwerp. Management and operation of shipping is entrusted to a Board of Inland Shipping appointed by the Belgian Ministry of Public Works.

German Railways and Road Transport

In order to relieve the railways in Germany and occupied territories, the authorities are now encouraging regular long-distance road transport of goods; licences and necessary petrol supplies are issued with few formalities to private transport undertakings in cases when sufficient regular goods traffic demands exist. Recently licences have been issued for routes to Berlin from centres as far as Prague, Antwerp, Amsterdam, as well as for many inland routes.

Transport Control in the Far East

In view of various transport problems which have arisen out of its attack on China, the Japanese Government has under consideration the amalgamation of the Ministries of Transport and of Railways in Japan. Plans for the fusion have been put forward on earlier occasions, but they are now supported by the military and naval departments.

Strategic Railways in the Middle East

It is evident that every effort is being made to expedite work on the construction of the Iranian State Railway line from Teheran to Tabriz which, when completed, will provide direct rail communication between Teheran and Turkey *via* a corner of Russian territory. The new Iranian line is being built to the standard 4 ft. 8½ in. gauge; from Tabriz to the Russian frontier at Julfa, and the portion on Russian soil are of 5 ft. gauge. It will be remembered that we recorded at page 558 of our April 12 issue that the first 90 miles from Teheran to Kazvin had been officially opened for traffic in March, and, at the end of April a Reuters message from Teheran reported that the first 112 miles of this line had been completed, indicating further progress. The most recent information to hand is based on reports from the American Consulate in Teheran which state that passenger trains over the Teheran—Kazvin section began regular service on July 8 last. Trains are stated to leave each terminus on Mondays and Thursdays, and in addition a special train runs between Teheran and Karaj twice every Friday. By June 23 construction had been completed for 227 km. (141 miles) from Teheran, namely, as far as a point known as Khorram-Derreh. At the end of July an Iranian delegation headed by the Director-General of the Ministry of Foreign Affairs visited Moscow to confer with Soviet representatives on the regulation of transport and transit affairs over Iranian and Soviet railways under the provisions of the Commercial Treaty between Iran and the Soviet Union.

STAFF AND LABOUR MATTERS

Engineering Wages

The engineering employers replied on November 5 to the claims for increased wages by the unions of the men in the industry. According to an official statement issued after the meeting the employers "could not accede to the applications." It was added that the unions will be reporting to their respective executives.

Sir Alexander Ramsay, director of the Engineering and Allied Employers' National Federation, made a careful statement of the employers' reasons. In the main the arguments were based on broad grounds of national policy, but, in addition, Sir Alexander Ramsay produced a table of actual earnings in the engineering industry and another table of comparative earnings in engineering and other industries to demonstrate that engineering workers are not in a disadvantageous position. The first part of the argument was that an advance of wages in engineering would add to the cost of war production, and therefore to the national expenditure, and the burden must fall on the community. In the second place Sir Alexander Ramsay pointed out the injurious effects of prices and wages pursuing each other.

The Amalgamated Engineering Union and the National Union of Foundry Workers had asked jointly for an increase of basic rates by 3d. an hour, or approximately 12s. a week, and the Joint Trades movement of the other engineering unions (which compose the Confederation of Shipbuilding and Engineering Unions) had presented an independent claim for an additional 10s. a week. The A.E.U. also asked for a restoration of working conditions which they surrendered in 1931.

A meeting of all executives of the unions in the confederation is to be held at York on November 19. The executive council of the A.E.U. will discuss the situation at an early meeting, and it is possible that the union's national committee may be summoned.

Trade Union Membership

According to the figures compiled by the Ministry of Labour from data supplied by the Chief Registrar of Friendly Societies and by the Registrar of Friendly Societies for Northern Ireland in respect of trade unions registered under the Trade Union Acts, and from returns supplied direct to the Ministry by unregistered organisations, the total membership of trade unions in Great Britain and Northern Ireland at the end of 1939 was approximately 6,234,000, an increase of 182,000, or 3 per cent. as compared with the membership at the end of 1938.

This figure compared with a total membership of 8,348,000 at the end of 1920—the year in which trade union membership reached its highest point—and with 4,135,000 at the end of 1913. The number of male trade unionists at the end of 1939 was 5,258,018 and

females 975,538, representing increases of 2.6 per cent. and 5.4 per cent. respectively.

The number of trade unions catering for the railway service is shown as seven and the total membership at the end of 1939 was 461,076 males and 8,957 females—a total of 470,033 as compared with 478,723 males and 8,356 females, a total of 487,078 in 1938. The decrease in male membership in 1939 as compared with 1938 was 3.7 per cent., while female membership increased by 7.2 per cent. The total decrease, males and females, was 3.5 per cent.

The total number of trade unions at the end of 1939 was 1,007 as compared with 1,023 at the end of 1938. Of these 680 unions, or over two-thirds of the total number, each had a membership of under 1,000. There were 40 unions with a membership of 25,000 or more and the aggregate membership of these amounted to nearly three-fourths of the total for all unions.

L.P.T.B. Disciplinary Board—Representation

An appeal by Mr. Moscrop, a motor-omnibus driver employed by the London Passenger Transport Board, against the decision of Mr. Justice Morton (recorded in THE RAILWAY GAZETTE for June 7) was allowed by the Court of Appeal on November 4.

Mr. Justice Morton had decided in favour of the London Passenger Transport Board in an action in which Mr. Moscrop complained that the defendant board had refused to allow him to be represented, in a disciplinary appeal, by an official of his trade union.

Lord Justice Scott, in the course of a written judgment, referred to the provision in paragraph 3 of the schedule to the defendant board's terms of employment, which provided: "Drivers and conductors appearing before a divisional superintendent or on appeal may be accompanied by an official of the union," and said that as, by definition, "union" meant the Transport Union, that provision plainly imported the negative—namely, that an appellant had no right to be represented by anyone else. On the facts he was of opinion that the board had in two respects committed a breach of the duty towards the appellant imposed by section 6 (1) of the Trade Disputes and Trade Unions Act, 1927.

When in 1938 the new National Union was formed the board were faced directly with the problem of inequality and ought to have realised that members of the new union would be "liable to be placed directly or indirectly under a disability or disadvantage" in respect of appeals as compared with members of the Transport Union. The defendant board should have made a general amendment of the representation clause in respect of appeals so as to extend equality of advantage to

men of each union and to non-union men. The whole question of section 6 had probably escaped notice.

Even had the peccant term been absent from the contract of employment, still, on the plaintiff's asking the disciplinary board for permission to be represented by the secretary of the National Union, the defendant board's refusal to allow an official of that union to appear would have involved a breach of section 6 (1), for they would thereby have imposed a condition on the plaintiff which was forbidden.

The essence of the section lay in its impartiality of attitude towards trade unions. Parliament plainly intended the principle of equal treatment to be applied thoroughly. That feature of the section afforded an additional reason for construing the section as applying beyond the primary case of contractual conditions and as embracing in its prohibition all conduct causing the same mischief.

The Court would order a declaration "that the condition in regard to representation by an official of the Transport Union imposed as part of the terms of employment of employees of the Transport Board by the provisions of clause 3 in the schedule to the memorandum of agreement of June 15, 1937, implies upon its true construction that no employee unless he be a member of the Transport Union shall be entitled to be represented at the hearing of an appeal by any person, and that the said condition is accordingly void by virtue of section 6 of the Act of 1927."

Lord Justice Luxmoore read a judgment of himself and Lord Justice Clauson agreeing that the appeal should be allowed.

Railway and Other Reports

West of India Portuguese Guaranteed Railway Co. Ltd.—A final dividend in respect of the half-year ending December 31, 1940, will be paid on January 15, 1941, of 2½ per cent. actual plus a bonus of ½ per cent. actual.

Grand Junction Company.—The directors have decided to defer consideration of an ordinary dividend until the results for the year ended March 31, 1941, are known. An interim of 1 per cent. was paid on December 1 last. The final was 2 per cent.

Hants & Dorset Motor Services Limited.—The interim dividend is 4 per cent., tax free, the same as a year ago.

Guest Keen & Nettlefolds Limited.—An interim dividend of 2½ per cent. tax free, on the ordinary capital will be paid on December 20 (same).

Geo. Turton Platts & Co. Ltd.—Net profit for the year to July 31, 1940, was £45,321, compared with £50,023 for 1938-39. The final ordinary dividend recommended is 10 per cent., making 17½ per cent. for the year, plus a bonus of 5 per cent. The amount to be carried forward is £19,722, against £24,772.

RAILWAY AND OTHER MEETINGS

Bengal Dooars Railway Co. Ltd.

The fiftieth ordinary general meeting of the Bengal Dooars Railway Co. Ltd. was held at the registered office of the company, Gresham House, Old Broad Street, London, E.C.2, on November 13, Mr. G. Anson Bayley, Chairman of the company, presiding.

The Secretary (Mr. F. J. Horne) read the notice convening the meeting and the auditors' report.

The Chairman, in moving the adoption of the report and accounts, said that before passing to the results of the year's working he had to say how much they missed 'the presence of Sir Kay Muir. He had been a director for thirty-eight years and they would have wished that it had been possible for him to be with them for this their last annual meeting; but some months ago Sir Kay Muir had decided to relinquish his business interests and his resignation had been accepted with much regret. He had intimate and extensive knowledge of the Indian tea industry and Indian business conditions, and this opportunity was taken of acknowledging the very valuable services Sir Kay Muir rendered to the company during this long period in office.

The report and accounts showed not unsatisfactory results. In view of the unprecedented conditions under which the company worked, and the fact that at the end of this year it would cease to be the proprietors of a railway, he did not propose to deal in detail with the figures. Because of communication difficulties the usual annual report on the year's working had not yet been received from India.

As regards earnings, coaching traffic receipts were Rs. 3,80,127, an increase of Rs. 8,488, goods traffic receipts were Rs. 14,41,254, a decrease of Rs. 96,300, and the combined ferry service and miscellaneous earnings showed an increase of Rs. 11,682. The total result was a decrease in earnings from all sources of Rs. 76,130.

Working expenses showed the satisfactory decrease of Rs. 31,901, but the percentage of working expenses to gross earnings increased by 0.72, being 60.30 per cent. as compared with 59.58 per cent. for the previous year.

After provision had been made for Indian income tax and super tax amounting to Rs. 1,23,053 (an increase of Rs. 11,405 over the previous year), the net revenue account showed that the aggregate earnings for the year were £49,271 7s. 4d., which with the balance brought into the accounts from the previous year, gave a total of £106,604 0s. 9d. From this had to be deducted the preference stock dividend for the year, amounting to £14,400, the interim dividend of 3 per cent. on the ordinary stock paid on March 29, 1940, £12,000, the reserve for United Kingdom income tax, £1,000, and exchange differences, £57 10s. 6d.,

making a total of £27,457 10s. 6d., and leaving a balance to be dealt with of £79,146 10s. 3d.

From this the directors recommended the payment of a final dividend of 5 per cent. on the ordinary stock, absorbing £20,000, and making a total of 8 per cent. for the year, which left a balance to be carried forward of £59,146 10s. 3d.

At the last annual general meeting in December, 1939, he had reminded stockholders that should the Government of India decide to exercise the option to purchase the railway at December 31, 1940, twelve months' notice of this intention had to be received by December 31, 1939. The company did receive this notice and stockholders were therefore informed by circular letter dated January 16, 1940, that formal notice had been given in conformity with the terms and conditions of contracts entered into from time to time with the Secretary of State for India in Council, and the Governor-General of India had decided to exercise the right to purchase and to take possession of the railway on December 31 of this year.

In normal times this one year's notice would have allowed of ample time to complete all necessary arrangements for the transfer of the railway; but the existing war conditions and the difficulties with which the directors had been confronted, principally due to unavoidable delays in communication between this country and India, had at times seriously retarded matters. This not only applied to the mass of detail which demanded attention, but to the settlement of the more important matters.

He was glad to be able to say, however, that they had made as good progress as could be expected under the existing conditions. It was first expected that the liquidators would be in a position to make a distribution to the ordinary stockholders of at least £200 for each £100 of stock in January, 1941. It was now expected that the distribution would be £210 per £100. The payments to the preference stockholders and the first distribution to the ordinary stockholders would be made from the first payment of £1,230,000, to be received on January 1, 1941, from the Secretary of State for India. The dates and amounts of further distributions by the liquidators were of course dependent upon the rapidity with which they could complete and close the somewhat complicated accounts.

It was perhaps a matter for congratulation that they had been allowed to retain their valuable property for so long as half a century, during the whole of which period the directors were pleased to be able to record that substantial dividends had been paid on the ordinary stock (the average for

the past twenty-eight years had been over 8 per cent. a year), and very large sums had been carried to reserve.

He did not propose to survey the history of the Bengal Dooars Railway over the fifty years under their proprietorship or to refer to the great changes affecting Indian railways during this time, but it was of interest to mention that the railway ran through country close to the foothills of the Himalayas and the many rivers from these hills were yearly subject to sudden rushes of flood water which had necessitated costly protection works and repairs to bridges and embankments.

It was proposed to hold an extraordinary general meeting of the company on January 1, 1941, to pass the necessary resolutions voluntarily winding up the company and appointing the liquidators.

As to the current period of the nine months to December 31, 1940, it might interest stockholders to learn that traffic had shown good results to date, the latest returns, at October 31, 1940, being Rs. 12,69,900 as compared with Rs. 10,58,940 for the corresponding period of the previous year, an increase of Rs. 2,10,960.

Before concluding he acknowledged the loyal service of the staff both in London and in India and especially those of long service. It was beyond question that without their efficiency and co-operation the results would not have been attained.

The Chairman then moved: "That the report of the directors and the audited statement of accounts for the year ended March 31, 1940, now presented, be and they are hereby approved, confirmed and adopted."

Mr. R. Langford James seconded the motion, which was carried unanimously.

The Chairman then moved: "That a final dividend of 5 per cent. on the ordinary stock of the company for the year ended March 31, 1940, subject to income tax, making, with the interim dividend of 3 per cent. paid on March 29, 1940, a distribution of 8 per cent. for the year, be and it is hereby declared to be paid to the holders of ordinary stock standing on the registers of the company on October 31, 1940, and that warrants for the dividend be issued on November 18, 1940."

Mr. J. A. Tassie seconded and the Resolution was carried unanimously.

The Chairman then moved the re-election of Mr. R. Langford James, the director retiring by rotation; Colonel W. R. Izat seconded the motion which was carried unanimously.

A Stockholder moved that Messrs. W. A. Browne & Company be elected as Auditors of the company for the ensuing period to December 31, 1940. This motion was also carried.

A hearty vote of thanks to the company's Agents in Calcutta, and to the manager and his staff in India was moved by the Chairman, seconded by Colonel W. R. Izat, and carried unanimously.

Notes and News

Institute of Transport.—A luncheon will be held on December 4, at 1.15 p.m., at the Connaught Rooms, London, W.C.2, which will be followed by an address by Lt.-Colonel J. T. C. Moore-Brabazon, Minister of Transport.

Collision on Southern Railway.—Shortly after 7 a.m. on November 12, a steam train travelling from London to Dover collided with a Southern Railway electric train standing in Woolwich Arsenal station. The driver of the electric train was injured but no passengers were hurt.

G.W.R. Penzance Express Accident.—The Great Western Railway announced on November 12 that the company will accept liability in connection with the accident to the Paddington-Penzance express at Norton Fitzwarren, near Taunton, on November 3, when 27 persons were killed and 58 injured.

Export of Goods Control.—Under the Export of Goods (Control) (No. 37) Order, made by the Board of Trade and effective from November 7, licences are required to export to any destination railway and tramway material of the following classes: buffers, springs (laminated or coiled), wheels, tyres, and axles (whether assembled or not), fishplates, and soleplates. Applications for licences should be made to the Controller, Export Licensing Department, Inveresk House, 346, Strand, London, W.C.2.

Mr. George Allison and the G.W.R.—Mr. George Allison, the well-known Manager of Arsenal Football Club, has been invited by the Great Western Railway Company to visit a number of the traffic, freight, locomotive, and engineering depots of the company to give a series of talks to railway employees during meal times. Although sport will figure largely in the talks, Mr. Allison will draw from his varied experience as journalist, manager of a football club and broadcast speaker

to provide entertainment and encouragement to men engaged on work vital to the war effort.

Exceptional Rates in Eire.—The Court of the Railway Tribunal (Eire) will sit at the Four Courts, Dublin, on November 21, to consider an application by the Great Southern Railways Company for consent to new exceptional rates exceeding 40 per cent. below the standard rates.

Improved Queensland Railways Revenue.—According to a radio message from Sydney, the Queensland Railways showed a surplus of £20,000 during the year ended June 30, 1940, as compared with a deficit of £53,000 in the previous financial year; the net revenue was £1,700,000 in 1939-40.

Compagnia Italiana Turismo (C.I.T. England) Limited.—At an extraordinary general meeting of this company held at the office of the Public Trustee, London, on October 28, an extraordinary resolution was passed that the company be wound up voluntarily, and that Mr. D. H. Allan be appointed liquidator.

Day and Night Surgery for Workers.—As part of a comprehensive welfare scheme a surgery has been built by British Timken Limited, Birmingham. In their own interests it has been made a rule that workers receiving even the slightest scratch at work must at once have it dressed. All treatment is free. The staff remains on duty during alerts and does not take cover even when the spotters send workers to their shelters. The surgery is strengthened against raid damage.

Railway Freight Rebates.—The Railway Rates Tribunal will sit at 11 a.m. on Tuesday, November 26, at Darley Ash, Bovingdon, Hemel Hempstead, Herts, to review the operation of the Railway Freight Rebates Scheme for the year ended September 30, 1940. Any railway company to which the said scheme applies or representative body of traders interested which may desire to be heard must file a notice at the

office of the Registrar of the Tribunal, Bush House, Aldwych, London, on or before November 21.

Earthquake in Roumania.—On November 10 a severe earthquake occurred in Roumania. Railway communications were seriously disorganized. It is stated that some trains were derailed by the shock and many others ceased to operate pending the examination of tracks and bridges.

British and Irish Railway Stocks and Shares

Stocks	Highest 1939	Lowest 1939	Prices	
			Nov. 12, 1940	Rise/ Fall
G.W.R.				
Cons. Ord.	38	21½	36	+ 1½
5% Con. Pref.	92	71	80	+ 1½
5% Red. Pref. (1950)	98	83	93½	+ 1½
4% Deb.	103	91	107	+ 2½
4½% Deb.	105½	93½	103½	—
5% Deb.	110	99	108½	—
5½% Deb.	121	109½	112½	—
2½% Deb.	63½	54	62	—
5% Rt. Charge	117	104	111½	—
5% Cons. Guar.	111	96½	109½	+ 3½
L.M.S.R.				
Ord.	17	9½	14½	+ 1½
4% Pref. (1923)	46½	20	38	+ 2
4% Pref.	63½	37	48½	—
5% Red. Pref. (1955)	85	58½	73½	—
4% Deb.	98½	85	100	+ 1½
5% Red. Deb. (1952)	109	101½	106	—
4% Guar.	87½	73	84½	+ 3½
L.N.E.R.				
5% Pref. Ord.	5½	3½	3½	—
Def. Ord.	3½	1½	1½	+ 1½
4% First Pref.	38½	15	35½	+ 2
4% Second Pref.	15	7½	10	—
5% Red. Pref. (1955)	55	38	50	—
4% First Guar.	78½	60	73½	+ 3
4% Second Guar.	68½	47	58	—
3% Deb.	71½	57	71	+ 2½
4% Deb.	93	76	83	—
4% Red. Deb. (1947)	106½	98	102	—
4½% Sinking Fund Deb.	104½	96	100	—
SOUTHERN				
Pref. Ord.	78	46½	46	+ 1½
Def. Ord.	19½	7	11½	+ 1½
5% Pref.	100	76	79½	+ 3½
5% Red. Pref. (1964)	102½	94	87½	—
5% Guar. Pref.	116½	103	109	+ 3
5% Red. Guar. Pref. (1957)	112½	102½	102½	—
4% Deb.	103	91½	101	- 2
5% Deb.	118½	109½	110½	—
4% Red. Deb. (1962-67)	106	98	101½	—
4% Red. Deb. (1970-80)	102	96	106½	—
FORTH BRIDGE				
4% Deb.	98½	81	87½	—
4% Guar.	95	80	85½	—
L.P.T.B.				
4½% "A"	115	103	106½	+ 1½
5% "A"	123	106½	116	+ 1½
4½% "T.F.A."	105	100½	103	—
5% "B"	117½	102	103	+ 1
"C"	84	63½	28½	—
MERSEY				
Ord.	24½	17½	20½	—
4% Perp. Deb.	93½	88½	89	—
3% Perp. Deb.	77	65½	59½	—
3% Perp. Pref.	55	49½	54½	—
IRELAND				
BELFAST & C.D.				
Ord.	6	3	4	—
G. NORTHERN				
Ord.	6	2½	3	—
G. SOUTHERN				
Ord.	13½	8	5	—
Pref.	26	10	16	—
Guar.	40½	22	18½	+ 1½
Deb.	57	45½	43	- 1

Irish Traffic Returns

IRELAND	Totals for 44th Week			Totals to Date		
	1940	1939	Inc. or Dec.	1940	1939	Inc. or Dec.
Belfast & C.D. (80 miles)	£ 2,828	£ 2,216	+ 612	£ 145,890	£ 116,987	+ 28,903
pass. goods	985	628	+ 357	27,113	20,848	+ 6,265
total	3,813	2,844	+ 969	173,003	137,835	+ 35,168
Great Northern (543 miles)	12,500	10,300	+ 2,200	546,550	505,400	+ 41,150
pass. goods	17,300	16,050	+ 1,250	582,600	484,300	+ 98,300
total	29,800	26,350	+ 3,450	1,129,150	989,700	+ 139,450
Great Southern (2,076 miles)	33,460	32,668	+ 792	1,578,495	1,656,128	- 77,633
pass. goods	62,761	63,890	- 1,129	2,079,331	1,950,834	+ 128,497
total	96,221	96,558	- 337	3,657,826	3,606,962	+ 50,864
L.M.S.R. (N.C.C.) (247 miles)	6,030	4,320	+ 1,710	253,370	209,460	+ 43,910
pass. goods	6,910	3,800	+ 3,110	182,820	134,190	+ 48,630
total	12,940	8,120	+ 4,820	436,190	343,650	+ 92,540

QUESTIONS IN PARLIAMENT

Interrupted Rail Services

Miss I. Ward (Wallsend—C.), on November 5, asked the Minister of Transport whether he would consider mobilising charabancs from all parts of the country, and making them available for individual stationmasters to use for travellers when railway transport broke down.

Lieut.-Colonel Moore-Brabazon (Minister of Transport) in a written reply stated that in London the provision of bus services when rail services were interrupted was arranged by the London Passenger Transport Board in co-operation with the railways. In the provinces similar arrangements were made by the Regional Transport Commissioners in conjunction with operators of public service vehicles. It would hardly be practicable and would certainly be wasteful to provide a pool of vehicles on which stationmasters could draw.

Traffic Returns

Sir Frank Sanderson (Ealing—C.), on November 5, asked the Minister of Transport, whether in view of the long-standing complaint of stockholders against the absence of frequent publication of traffic receipts, he would consider if there was any form of information which he could give monthly which he would not regard as being against the national interest.

Lieut.-Colonel J. T. C. Moore-Brabazon replied that under war conditions there was no information of that kind that he could agree to publish monthly.

London Underground Railways

Miss Thelma Cazalet (Islington East—C.), on November 5, asked the Minister of Transport whether he was aware of the difficulties still being experienced by workers travelling by the Underground Railway, due to the public being allowed into the stations for shelter during the day; and would he ensure that the regulations as to the hour of admittance were strictly enforced.

Lieut.-Colonel Moore-Brabazon said he would communicate with Miss Cazalet as soon as enquiries he was making had been completed.

Facilities at Swansea

Mr. D. L. Mort (Swansea East—Lab.), on November 5, asked the Minister of Transport whether he was aware that service men arriving at Swansea with the evening train, late owing to the slow running, could not get conveyance to West Wales; and whether he would provide sleeping accommodation or, alternatively, transport for them.

Lieut.-Colonel J. T. C. Moore-Brabazon replied that so far as he was aware, the demand was insufficient to justify the provision of special railway or bus facilities, but he was willing to make further inquiries.

Expenditure of Railways

Sir Herbert Williams (South Croydon—C.), on November 6, asked the Minister of Transport if he could state the present rate of annual expenditure of the railways; how much of this was wages and salaries; and how these figures compared with those prior to the war.

Lieut.-Colonel Moore-Brabazon: I am making inquiries and will communicate with my hon. Friend.

The Norton Fitzwarren Accident

Lieut.-Colonel Moore-Brabazon, in reply to a question by Lieut.-Colonel E. T. R. Wickham (Taunton—C.), on November 6 said, he was informed that the accident to the Paddington-Penzance express on November 4 at Norton Fitzwarren showed no evidence of being in any way due to defective track, sabotage or enemy action. He had appointed Lieut.-Colonel Mount, Chief Inspecting Officer of Railways, to hold a full inquiry.

Reduced Fare Facilities

Mr. Walter Green (Deptford—Lab.), on November 6, asked the Minister of Transport whether his attention had been drawn to the hardship created for fathers whose families had been evacuated, and if he would arrange for reduced fare facilities so that they might visit their families.

Lieut.-Colonel Moore-Brabazon in reply stated that facilities were available to enable parents to visit school children evacuated in school parties and billeted by the Government. The possibility of extending these facilities to persons who had made private arrangements would be examined, but there were many demands on the railways which had to receive prior consideration.

L.M.S. Railway and Coal Deliveries

Mr. E. A. Radford (Manchester, Rusholme—C.), on November 6, asked the Secretary for Mines whether he was aware that, since his circular letter to local authorities of July 12, only 120 tons of coal had been received by the Manchester Corporation under the Government's stocking scheme for Manchester, as compared with an average weekly winter consumption in that city of not less than 30,000 tons.

Mr. David Grenfell (Secretary for Mines): I am well aware that, owing to the heavy demand from consumers for stocking, the margin of supplies available for Government dumps in Manchester has been small, and I am taking steps, in consultation with the Minister of Transport and the Minister of Shipping which should result in increased deliveries.

Mr. Radford: How is it, since we control the railways, that we cannot order the London Midland & Scottish Railway Company to carry the additional coal needed?

Mr. Grenfell: There are conditions which are very difficult for all traffic

working. There is the closest co-operation between the Ministry of Transport, the Ministry of Shipping, and myself. A special committee has been set up to deal with this question, and we are achieving important results.

Fares for Members of Forces

Mr. W. Thorne (Plaistow—Lab.), on November 7, asked the Minister of Transport whether the proposed six per cent. increase in rail fares would apply to members of the Forces travelling other than on a leave warrant; and would he secure some concession for them.

Lieut.-Colonel J. T. C. Moore-Brabazon stated that members of the Forces, travelling on leave at their own expense, paid half ordinary single fare for a single journey, and ordinary single fare for a return journey. When ordinary fares were increased in accordance with the fares payable by the Forces would be correspondingly increased.

Railway Workers and Home Guard

Mr. W. Dobbie (Rotherham—Lab.), on November 7, asked the Home Secretary whether he was yet able to give an answer to the letter sent to him some time ago, in reference to a complaint that a number of railwaymen had been refused membership of the Home Guard by a railway company owing to a secret report of the police.

Mr. Herbert Morrison (Home Secretary) said he had made full inquiries, and found that a mistake was made, which he much regretted. There was, from the police point of view, no objection to the enrolment of the men in question.

Contracts and Tenders

The Bengal-Nagpur Railway has placed the following contracts:

John Baker & Bessemer Limited: 24 steel tyres.

Miller & Co. Ltd.: 200 chilled cast-iron wheels.

Taylor Bros. & Co. Ltd.: 10 steel wagon axles.

Hadfields Limited: 95 cast steel wheels.

Geo. Turton, Platts & Co. Ltd.: buffers and buffer cases.

Linley & Co. Ltd.: 5 copper firebox tubeplates.

Bremen radio states that because of the increasing amount of goods traffic on the railways in Denmark, 500 wagons and a number of locomotives are to be manufactured. The locomotives are to be bought abroad, but the wagons will be constructed at Danish works.

Forthcoming Events

Nov. 19 (Tues.).—Institution of Civil Engineers, Great George Street, London, S.W.1, 1.30 p.m. The Dugald Clerk Lecture: "Methods of excavation work at home and abroad," by Mr. W. Barnes.

Nov. 26 (Tues.).—Institute of Transport (Birmingham Graduate), at Imperial Hotel, 6.30 p.m. "Transport and ancillary insurance," by Mr. E. R. Smith.

Railway Stock Market

The upward movement in security values has made further progress, and although Stock Exchange business was again small, prices in most sections were marked higher. This reflects the small amount of selling in evidence and the firmness with which all classes of securities are held. Despite the better prices, many stocks remain in short supply in the market, and in the home railway section, debentures and prior-charges are difficult to obtain in any amount. Yields offered by the debentures are still regarded as attractive when considered in relation to their high investment merits, and guaranteed stocks have been favoured because they are cumulative as to dividend and give a generous return. Home railway securities again provided one of the more active features of the stock and share markets, but this week the tendency was for attention to centre more on the junior issues; the assumption was that, even taking more than a short view, they are very moderately priced, granted market expectations are borne out. The belief remains current that whatever revision is made to the financial agreement with the Government, the minimum net revenues guarantee to the companies will be maintained, and that it is not

unlikely the position as to air-raid damage may be placed on a more secure basis by the forthcoming insurance scheme.

Compared with a week ago, Great Western ordinary stock further improved from 34½ to 36. The guaranteed stock was marked up from 106 to 109½, and the preference stock from 78 to 80. Moreover, the 4 per cent. debentures rose on balance from 104½ to 106½. Among L.M.S.R. issues chief attention was given to the junior stocks, and the ordinary improved to 14½, a gain of a point. The senior preference, which in some quarters is considered to be much undervalued in relation to L.N.E.R. second guaranteed, appreciated two points to 50½, and the 1923 preference was 37½, compared with 36 a week ago. Moreover, L.M.S.R. guaranteed stock advanced four points to 84½, and the 4 per cent. debentures from 98½ to par. The guaranteed stock is, of course, extremely well covered as to dividend on the basis of the minimum net revenue, and the yield offered still seems on the generous side. The prevailing view is that, despite the increasing cost of materials and operation, the net revenues of the main-line railways are running slightly above the minimum guaranteed by the Government, and it is hoped that

dividends on the ordinary and other junior stocks will differ very little from those paid for 1939. On this basis, yields at current prices are substantial, and as mentioned here on various occasions, the market anticipates that the expected revision of the financial agreement will be equitable to the railways.

Among Southern Railway stocks, the preferred moved up from 44½ to 46, the deferred from 10½ to 11½, and the preference stock from 76 to 79½. Southern guaranteed was three points higher at 109, and the 4 per cent. debentures 101 compared with 99 a week ago. L.N.E.R. first preference improved from 34 to 36, and the second preference from 10 to 11½. Furthermore, the first guaranteed rose from 60½ to 73, and the second guaranteed from 60½ to 62½. L.N.E.R. 3 per cent. debentures moved higher to 71 and the 4 per cent. debentures from 88 to 92. London Transport "C" stock was a point better at 29.

Argentine railway issues were again dull and inactive, awaiting the annual reports. Indian railway securities were higher, where changed, an in other sections of the market Canadian Pacific Railway preference stock further improved from 43½ to 44½.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

Railways	Miles open 1939-40	Week Ending	Traffic for Week		No. of Weeks	Aggregate Traffics to Date		Shares or Stock	Prices			
			Total this year	Inc. or Dec. compared with 1939		Totals			Increase or Decrease	Highest 1939	Lowest 1939	
			This Year	Last Year						Nov. 12, 1940	Yield % (See Note)	
Antofagasta (Chili) & Bolivia	834	3.11.40	£ 1,4630	£ 3,230	44	£ 745,900	£ 590,820	+ £ 155,080	Ord. Stk.	10½	4½	5½ Nil
Argentine North Eastern	753	2.11.40	ps. 144,300	+ ps. 11,400	18	ps. 3,101,700	ps. 3,152,000	- ps. 50,300	6 p.c. Deb.	4½	2	2½ Nil
Bolivar	174	Oct. 1940	3,180	- 1,320	43	39,150	34,390,450	- ps. 9,526,400	Bonds.	5½	4½	6½ Nil
Brazil	...	...	...	...	...	...	...	...	...	2	2	Nil
Buenos Ayres & Pacific	2,801	2.11.40	ps. 1,090,000	- ps. 15,000	18	ps. 20,104,000	ps. 21,846,000	- ps. 1,742,000	Ord. Stk.	13½	4½	4½ Nil
Buenos Aires Central	190	10.8.40	899,500	- \$31,600	6	\$557,500	\$647,500	- \$90,000	Ord. Stk.	10½	4½	2½ Nil
Buenos Ayres Gt. Southern	5,082	2.11.40	ps. 2,047,000	+ ps. 61,000	18	ps. 33,668,000	ps. 34,921,000	- ps. 1,253,000	Ord. Stk.	10½	4½	2½ Nil
Buenos Ayres Western	1,930	2.11.40	ps. 723,000	+ ps. 98,000	18	ps. 11,406,000	ps. 12,486,000	- ps. 1,080,000	Ord. Stk.	6	3	1½ Nil
Central Argentine Do.	3,700	2.11.40	ps. 1,351,100	- ps. 137,400	18	ps. 25,064,050	ps. 34,390,450	- ps. 9,526,400	Ord. Stk.	3½	1/2½	7½ Nil
Cent. Uruguay of M. Video	972	2.11.40	27,583	+ 9,599	18	342,364	306,222	+ 36,142	Ord. Stk.	2½	7½	1½ Nil
Costa Rica	188	May 1940	17,282	- 7,020	48	193,339	245,516	- 52,177	Stk.	24½	18	17½ Nil
Dorada	70	Oct. 1940	11,700	- 1,300	43	122,400	136,700	- 14,300	I Mt. Db.	10½	102	98 6½
Entre Rios	810	2.11.40	ps. 202,700	+ ps. 2,200	18	ps. 4,231,100	ps. 4,736,500	- ps. 505,400	Ord. Stk.	6	3	1½ Nil
Great Western of Brazil	1,016	2.11.40	13,200	- 1,100	44	442,200	369,800	+ 72,400	Ord. Stk.	3½	1/2½	7½ Nil
International of Cl. Amer.	794	Sept. 1940	\$325,789	- \$37,196	39	\$4,405,419	\$4,486,381	- \$80,962	—	—	—	— Nil
Interoceanic of Mexico	—	—	—	—	—	—	—	—	1st Pref.	7½	7½	4½ Nil
La Guaira & Caracas	22½	Oct. 1940	6,795	+ 1,180	43	67,095	60,725	+ 6,370	Ord. Stk.	2½	4½	2½ Nil
Leopoldina	1,918	10.10.40	27,288	+ 3,141	42	961,659	868,452	+ 93,207	Ord. Stk.	1½	4½	2½ Nil
Mexican	483	30.9.40	ps. 425,800	+ ps. 21,600	13	ps. 3,539,400	ps. 2,682,800	- ps. 143,400	—	—	—	— Nil
Midland of Uruguay	319	Sept. 1940	11,468	+ 2,820	13	32,831	26,138	+ 6,693	Ord. Sh.	2½	1½	1½ Nil
Nitrate	386	31.10.40	5,987	+ 1,532	43	146,671	98,199	+ 48,472	Pr. Lt. Stk.	45½	36	38 15½
Paraguay Central	274	2.11.40	\$2,965,000	+ \$487,000	18	\$62,813,000	\$58,693,000	+ \$4,120,000	Pr. Lt. Stk.	1½	7½	1½ Nil
Peruvian Corporation	1,059	Oct. 1940	56,878	+ 4,393	17	265,325	254,699	+ 10,626	Ord. Stk.	38	20	29 8½
Salvador	100	21.9.40	76,507	+ 1,987	12	108,711	121,775	+ 13,064	Ord. Stk.	4½	6/6	9½ Nil
San Paulo	153½	27.10.40	36,500	+ 3,248	43	1,560,996	1,403,575	+ 157,421	Ord. Stk.	—	—	— Nil
Taltal	160	Aug. 1940	2,465	+ 335	9	4,550	3,685	+ 865	Ord. Stk.	2	4	— Nil
United of Havana	1,353	2.11.40	13,953	- 126	18	276,268	320,465	- 44,197	Ord. Stk.	—	—	— Nil
Uruguay Northern	73	Sept. 1940	970	- 63	13	2,870	2,683	+ 187	—	—	—	— Nil
Canadian	23,695	31.10.40	1,584,664	+ 214,249	43	40,280,194	32,837,819	+ 7,442,375	Perp. Dbs.	7½	60	74 5½
Canadian Northern	—	—	—	—	—	—	—	—	4 p.c.	100½	76	102 3½
Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	7½	3½	5½ Nil
Canadian Pacific	17,153	31.10.40	1,178,600	+ 174,400	43	27,729,800	24,422,600	+ 3,307,200	Ord. Stk.	—	—	— Nil
Assam Bengal	1,329	30.4.40	45,187	+ 6,529	4	135,060	120,437	+ 14,623	Ord. Stk.	7½	60	77½ 3½
Barsi Light	202	29.9.40	3,682	+ 907	24	71,160	56,332	+ 14,828	Ord. Stk.	27½	22½	24½ 6½
Bengal & North Western	2,091	Oct. 1940	235,425	+ 35,048	4	235,425	200,377	+ 35,048	Ord. Stk.	9½	84½	212½ 3½
Bengal Doors & Extension	161	Sept. 1940	14,625	+ 508	26	78,405	66,243	+ 12,162	—	94½	83½	92½ 4½
Bengal-Nagpur	3,269	10.8.40	204,075	+ 16,707	19	3,079,954	2,834,428	+ 245,526	—	108	90	103 5½
Bombay, Baroda & Cl. India	2,986	31.10.40	287,925	+ 37,500	29	5,577,675	4,937,100	+ 640,575	—	104½	92	99½ 7½
Madras & Southern Mahratta	2,967	10.9.40	134,775	- 9,101	23	2,679,368	2,628,099	+ 51,269	—	280	263	250 6½
Rohilkund & Kumaon	571	Oct. 1940	43,500	+ 5,745	4	43,500	37,755	+ 5,745	—	102½	88	84½ 5½
South Indian	2,542	10.9.40	123,945	+ 1,089	23	2,015,210	1,866,987	+ 148,223	—	—	—	— Nil
Beira	204	Aug. 1940	85,336	- 48	23	832,782	83,648	- 7,066	Prf. Sh.	—	—	— Nil
Egyptian Delta	623	10.9.40	5,329	+ 271	23	76,582	83,648	- 7,066	—	—	—	— Nil
Kenya & Uganda	1,625	—	—	—	—	—	—	—	—	—	—	— Nil
Manila	—	—	—	—	—	—	—	—	B. Deb.	55	39	47½ 7½
Midland of W. Australia	277	July 1940	11,397	+ 139	4	11,397	11,258	+ 139	Inc. Deb.	91½	87½	82½ 4½
Nigerian	1,900	31.8.40	27,727	+ 3,258	22	783,893	601,488	+ 182,405	—	—	—	— Nil
Rhodesia	2,442	Aug. 1940	512,446	- 48	—	4,428,678	—	—	—	—	—	— Nil
South Africa	13,287	12.10.40	663,938	- 21,953	28	18,939,881	18,085,814	+ 854,067	—	—	—	— Nil
Victoria	4,774	July 1940	868,428	+ 183,538	4	868,428	684,890	+ 183,538	—	—	—	— Nil

Note. Yields are based on the approximate current prices and are within a fraction of $\frac{1}{2}$. Argentine traffics are now given in pesos
* Quotation is of June 17, 1940; dealings subsequently prohibited † Receipts are calculated at £s. 6d. to the rupee